The invention relates to a oral smokeless product comprising magnesium carbonate. The invention provides stabilization of basic pH at the surface of the product during oral use thereof, without reducing nicotine mobility within the oral smokeless tobacco or nicotine-containing non-tobacco product. The invention in one aspect relates to an oral smokeless tobacco or nicotine-containing non-tobacco product comprising a composition enclosed by a wrapping material, wherein the wrapping material comprises a magnesium carbonate. In another aspect, the invention relates to an oral smokeless tobacco or nicotine-containing non-tobacco product comprising a composition enclosed by a wrapping material, and comprising a liner adjacent to the wrapping material, wherein the liner comprises magnesium carbonate in an amount of 0.1 to 10%, by total weight of the oral smokeless product.
A TOBACCO OR NON-TOBACCO PRODUCT COMPRISING MAGNESIUM CARBONATE

TECHNICAL FIELD

The invention relates to an oral smokeless tobacco or nicotine-containing non-tobacco product, in particular to such product comprising a magnesium carbonate.

BACKGROUND

Smokeless tobacco products for oral use are made from tobacco leaves, such as lamina and stem of the tobacco leaf. The material from roots and stalks are normally not utilized for production of smokeless tobacco compositions for oral use.

There are two types of moist snuff, the American type and the Scandinavian type which is also called snus. American-type moist snuff is commonly produced through a fermentation process of moisturized ground or cut tobacco. Scandinavian-type moist snuff (snus) is commonly produced by using a heat-treatment process (pasteurization) instead of fermentation. The heat-treatment is carried out in order to degrade, destroy or denature at least a portion of the microorganisms within the tobacco preparation.

Both the American-type and the Scandinavian-type of moist snuff for oral use are available in loose form or portion-packed in a saliva-permeable, porous wrapper material forming a pouch. Pouched moist snuff, including snus, is typically used by the consumer by placing the pouch between the upper or lower gum and the lip and retaining it there for a limited period of time. The pouch material holds the tobacco in place while allowing saliva to pass into the tobacco and allowing flavours and nicotine to diffuse from the tobacco material into the consumer's mouth.

The pouch material is typically a nonwoven fleece (soft fabric) material, such as viscose (regenerated cellulose; viscose fibers are often referred to as viscose rayon or rayon), including an acrylic polymer that acts as binder in the nonwoven material and provides for heat-sealing of the pouches during manufacturing thereof. The viscose nonwoven material normally used for pouched smokeless tobacco products is similar to the fabric used in tea bags. Nonwovens are fabrics that are neither woven nor knitted. Methods for the manufacturing of nonwoven materials are commonly known in the art.

Pouched smokeless tobacco products for oral use may be post-moisturized after pouch formation or not post-moisturized after pouch formation, which herein is referred to as non-
post-moisturized. Post-moisturized pouched products may be produced by spraying water on the pouched smokeless tobacco product before packaging the pouch products in cans. Post-moisturized pouches are sometimes referred to as "original snus". Non-post-moisturized pouched products are sometimes referred to as "white snus" and are by some consumers considered to have a more appealing appearance.

Pouched smokeless tobacco products may be produced by measuring portions of the smokeless tobacco composition and inserting the portions into a nonwoven tube. Pouched smokeless tobacco products may alternatively be produced by placing portions of moist snuff on a nonwoven web using a pouch packer machine in accordance with the device disclosed in US 6,135,120.

Oral pouched smokeless tobacco products are normally sized and configured to fit comfortably and discreetly in a user’s mouth between the upper or lower gum and the lip.

There are also nicotine-containing non-tobacco snuff products and nicotine-free non-tobacco snuff products available which may be offered as alternatives to smokeless tobacco products.

An example of a nicotine-containing non-tobacco snuff product is provided in WO 2012/134380. This type of non-tobacco snuff product for oral use may be portion-packed in a saliva-permeable, porous wrapper material forming a pouch.

Alkaline pH adjusting agents (pH adjusters) are traditionally used in the composition of most oral smokeless tobacco or nicotine-containing non-tobacco products, including snus, to maintain a basic pH. pH adjusters, such as sodium carbonate or sodium bicarbonate, brings the pH value to the slightly alkaline side, such as about pH 7.5 to 9. Sodium carbonate may also be used to give the products their characteristic aroma profile. Typically, the amount of pH adjuster in the smokeless tobacco or nicotine-containing non-tobacco composition is less than about 7% w/w, such as within the range of from about 3 to about 5% w/w, based on dry weight of the tobacco composition. Further, in WO 2009/082331, magnesium carbonate was used as a pH stabilizer to attain a stabilized basic pH in the tobacco composition of an oral smokeless tobacco product, to improve the product's storage stability.

pH is also known to be one of several factors regulating the uptake of nicotine during use of an oral smokeless tobacco product.

Whereas a basic pH improves the product's microbiological stability, it reduces nicotine mobility within the product (nicotine extraction) and may detrimentally affect the product's taste.
On the other hand, an acidic pH of an oral smokeless tobacco product improves nicotine extraction, but will seriously diminish the nicotine uptake in the oral cavity. Furthermore, an acidic pH may have detrimental effects on oral health (e.g. dental health). Hence, there is a need for improved oral smokeless tobacco or nicotine-containing non-tobacco products balancing nicotine uptake, nicotine extraction and oral health.

The object of the present invention is to overcome or at least mitigate some of the problems associated with the prior art.

SUMMARY

The present document relates to an oral smokeless tobacco or a nicotine-containing non-tobacco product comprising a composition enclosed by a wrapping material, wherein the wrapping material comprises a magnesium carbonate. The present document also relates to an oral smokeless tobacco or nicotine-containing non-tobacco product comprising a composition enclosed by a wrapping material, and comprising a liner adjacent to the wrapping material, wherein the liner comprises magnesium carbonate in an amount of 0.1 to 10 %, by total weight of the oral smokeless product. The present document is also directed to the use of magnesium carbonate in a wrapping material and/or liner of an oral smokeless tobacco or a nicotine-containing non-tobacco product for stabilizing the oral pH during use of said product.

The present document is therefore directed to an oral smokeless tobacco or nicotine-containing non-tobacco product comprising a composition enclosed by a wrapping material forming a pouch and optionally a liner adjacent to the wrapping material inside the pouch, wherein the wrapping material and/or liner comprises magnesium carbonate in an amount of at least 0.1% by total weight of the oral product, such as 0.1-10%, 0.5-4%, or 1-3% by total weight of the oral product. The magnesium carbonate may be applied on the outer or inner surface of the wrapping material and/or liner.

The composition enclosed by the wrapping material may be a smokeless tobacco composition or nicotine-containing non-tobacco composition.

The pH of the tobacco or nicotine-containing non-tobacco composition of the oral smokeless tobacco or nicotine-containing non-tobacco product may be about 8-9. The pH of the tobacco or nicotine-containing non-tobacco composition of the oral smokeless tobacco or nicotine-containing non-tobacco product may alternatively be about 6-8, such as about 7.5-8 or about 7.7-7.9. The pH may be regulated by the addition of one or more pH adjuster(s). The tobacco or nicotine-containing non-tobacco composition as such may also be devoid of any added pH adjuster(s), such as magnesium carbonate.
The tobacco or nicotine-containing non-tobacco composition of the oral smokeless tobacco or nicotine-containing non-tobacco product may comprise magnesium carbonate in an amount from 0.1-1%, such as 1-5%, by weight of the composition (in addition to the magnesium carbonate present in the wrapping material and/or liner).

The oral smokeless tobacco or nicotine-containing non-tobacco product may be in the form of snuff, snus or chewing tobacco, or is in a form resembling snuff, snus or chewing tobacco.

The liner of the oral smokeless tobacco or nicotine-containing non-tobacco product may be water-soluble or not water-soluble.

The wrapping material of the oral smokeless tobacco or nicotine-containing non-tobacco product may comprise magnesium carbonate and a water-soluble polymer, such as one or more of PVA, PVP, HPC, HPMC, CMC.

The oral smokeless tobacco or nicotine-containing non-tobacco product may be non-post-moisturized. The oral smokeless tobacco or nicotine-containing non-tobacco product may be contained in a box, can or canister.

The present document is also directed to the use of magnesium carbonate in a wrapping material and/or liner of an oral smokeless tobacco or a nicotine-containing non-tobacco product for stabilizing the oral pH during use of said product.

The present document is also directed to a method for the in situ formation of magnesium carbonate in a wrapping material and/or an optional liner of an oral smokeless tobacco or nicotine-containing non-tobacco product comprising a composition enclosed by said wrapping material thereby forming a pouch, said method comprising providing an aqueous polymer-containing solution comprising magnesium carbonate to said wrapping material and/or optional liner.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 shows oral pH during use of oral smokeless tobacco products in the form of tobacco-filled pouches without added magnesium carbonate, tobacco-filled pouches comprising magnesium carbonate in the tobacco composition (bulk) only (10% by total weight of the oral smokeless product), and tobacco-filled pouches with magnesium carbonate added to the wrapping material only (2% by total weight of the oral smokeless product according to Example A), respectively.
Figure 2 shows that the mobility of nicotine in snus decreases with rising pH of the tobacco composition. Loose snus (i.e. without wrapping material) with various pH values were loaded into columns and extracted with water solutions (ion strength = 1 M, pH = same as the respective snus). At pH 6.66, 120% were extracted, as compared to a reference with pH 7.84 (reference = 100%). The figure shows that the mobility is higher for protonized nicotine in snus than for unprotonized nicotine.

Figure 3 shows oral pH during 30 minutes' use of an oral smokeless tobacco product with magnesium carbonate added only to the wrapping material, compared with an oral smokeless tobacco product devoid of any added magnesium carbonate (Example B).

Figure 4 shows comparative oral pH values during 30 minutes use of oral smokeless tobacco products with 2% magnesium carbonate added to the wrapping material only (Example A), and 1% magnesium carbonate in the tobacco composition (bulk) of the oral smokeless tobacco product only, respectively, by total weight of the oral smokeless tobacco product.

DEFINITIONS

By "tobacco" is meant any part, e.g., leaves, stems, and stalks, of any member of the genus Nicotiana. The tobacco may be whole, shredded, thressed, cut, ground, cured, aged, fermented, or treated in any other way, e.g., granulated or encapsulated.

By "non-tobacco material" is herein meant non-tobacco material, typically constituted of non-tobacco plant material and/or a particulate non-tobacco material comprising one more fillers, such as polysaccharides (e.g. maltitol or mannitol) and/or microcrystalline cellulose. The nicotine-containing non-tobacco composition as disclosed herein in addition to non-tobacco material further comprises nicotine or a salt thereof (such as nicotine bitartrate). Suitable non-tobacco plant materials are non-tobacco plant fibres, in particular dietary plant fibres, such as maize fibers, oat fibres, tomato fibers, barley fibers, rye fibers, apple fibres, sugar beet fibres, potato fibres, corn fibres, buckwheat fibres, cocoa fibres, bamboo fibers, citrus fibers and any combinations thereof.

"Oral" and "oral use" is in all contexts used herein as a description for use in the oral cavity, such as buccal placement.

As used herein "pouched product" or "oral pouched product" and the like refers to a portion of e.g. smokeless tobacco composition or nicotine-containing non-tobacco composition packed in a saliva-permeable pouch material intended for buccal placement in the oral cavity. The oral
pouched product may alternatively be referred to as a portion-packed (pouched) product for oral use.

As used herein, the term "water content" refers to the total amount of water in the preparation, composition or product referred to. The water content is given herein as percent by weight (wt%) of the total weight of the preparation, composition or product referred to. Water content may be measured by using a standardized method for water analysis, such as, Karl Fischer titration or gas chromatography (GC).

As used herein, the term "moisture content" refers to the total amount of volatile ingredients, such as water and other oven volatiles (e.g. propylene glycol and ethanol) in the composition or product referred to. The moisture content is given herein as percent by weight (wt%). The moisture content of a tobacco material or non-tobacco plant fibers, if present, may be determined by using a method based on literature references Federal Register/ vol.74, no. 4/71 2-71 9/Wednesday, January 7, 2009/Notices, "Total moisture determination" and AOAC (Association of Official Analytical Chemists), Official Methods of Analysis 966.02: "Moisture in Tobacco" (1990), Fifth Edition, K. Helrich (ed). In this method, the oven volatile (OV) content of the tobacco material and the non-tobacco plant fibers, if present, is determined gravimetrically by taking 2.5±0.25 g sample and weighing the sample before evaporation of moisture and after evaporation of moisture. Mettler Toledo's Moisture Analyzer HB43, a balance with halogen heating technology, may be used (instead of an oven and a balance as in the mentioned literature references). The sample can be heated to 105°C (instead of 99.5±0.5°C as in the mentioned literature references). The measurement is stopped when the weight change is less than 1 mg during a 90 seconds time period. The moisture content (i.e. oven volatile content) as weight percent of the original weight of the sample is then calculated automatically by the Moisture Analyzer HB43.

The term "additive" or "additional ingredient" as used herein denotes substances other than tobacco material or non-tobacco material, salt (e.g. sodium chloride, potassium chloride, magnesium chloride, calcium chloride and any combinations thereof), pH adjuster (e.g. sodium hydroxide, potassium hydroxide, potassium carbonate, sodium carbonate or sodium bicarbonate) and water. Examples of additives or additional ingredients that may be present in a product of the present document include, but are not limited to, flavouring agents, cooling agents, heating agents, sweetening agents, colorants, humectants (e.g. propylene glycol or glycerol), antioxidants, preservatives (e.g. potassium sorbate), binders, fillers, non-tobacco plant fibers and disintegration aids. Such additives may or may not be added to any oral smokeless tobacco or nicotine-containing non-tobacco product disclosed herein.
"Flavour" or "flavouring agent" is used herein for a substance used to influence the aroma and/or taste of the smokeless tobacco product, including, but not limited to, essential oils, single flavour compounds, compounded flavourings, and extracts.

As used herein, reference to "dry weight percent" refers to weight percent of the ingredient referred to on the basis of the total weight of dry ingredients, i.e. all ingredients of the preparation, composition or product referred to excluding moisture content.

As used herein "% w/w" or "wt%" or "weight %" means weight percent of the component referred to based on the weight of the total composition or product referred to unless otherwise explicitly stated.

As used herein, the term "wrapper" or wrapping material" refers to a saliva-permeable (and preferably non-dissolvable) material enclosing a tobacco or nicotine-containing non-tobacco composition thereby forming a pouch, thereby providing a pouched product. The wrapping material may be made of any suitable saliva-permeable pouch material, such as non-woven, woven or knitted materials made from e.g. fibers of cellulose (e.g. cotton), derivatives of cellulose, regenerated cellulose (e.g. viscose), binders, synthetic fibers or synthetic polymers or combinations thereof. The terms "wrapper" and "wrapping material" may be used interchangeably in this document.

By "liner" is in the context of the present document meant a material separate from the wrapping material and typically not attached thereto. The liner is typically placed inside the pouch formed by the wrapping material and adjacent thereto (i.e. in close vicinity to the wrapping material) in order for the magnesium carbonate to be close to the surface of the product for it to effect its pH stabilizing effect on oral pH. The liner may consist of or comprise a water-soluble composition, e.g. CMC and PVP. Alternatively, the liner is made of a material which is not water-soluble, i.e. which does not dissolve upon oral use of the oral smokeless tobacco or nicotine-containing non-tobacco product. The liner may be in the form of a dyestuff or varnish. The liner may also comprise or consist of cellulose, derivative(s) of cellulose, synthetic fibers, binders or combinations thereof. The liner may be present as a strip or patch. The liner may partially or fully enclose the composition.

By "outer surface" is in the context of the present document meant a surface of a product or part thereof facing a user during use of the product. By "inner surface" is meant a surface of a product or part thereof not facing a user during use of the product.

By "stabilization of oral pH" and the like is in the context of the present document meant a local stabilization of the pH in the contact volume between an oral smokeless tobacco or nicotine-
containing non-tobacco product and the oral mucosa, i.e. what is intended is not a stabilization of the pH in the oral cavity as a whole but only a stabilization of the local pH in the space between the product and the oral mucosa. Similarly, by the term "oral pH" is meant the pH in the contact volume between a tobacco or nicotine-containing non-tobacco product and the oral mucosa and not the pH in the oral cavity as a whole.

DETAILED DESCRIPTION

It is known that the pH of an oral smokeless tobacco product drops during storage thereof. However, it has now surprisingly been found that the oral pH drops also during the oral use of an oral smokeless tobacco product or nicotine-containing non-tobacco product (see Figure 1, continuous line). Nicotine permeability through the mucous membrane depends on pH, with the uptake improving with higher pH (see e.g. Chen et al., International Journal of Pharmaceutics, 184 (1999) 63-72). A drop in pH during use of the product will thus impair the nicotine uptake from the surface of the oral smokeless tobacco product. Also, a lower pH may have negative effects on the teeth.

As a consequence, there is a need to stabilize the pH at the surface of an oral smokeless tobacco or nicotine-containing non-tobacco product during oral use thereof. A mentioned above, it is known from WO 2009/082331 that magnesium carbonate can be incorporated into the smokeless tobacco or non-tobacco composition itself to stabilize the pH of the composition in order to effect a longer storage capability. However, a higher pH in a nicotine-containing composition does not favour nicotine release therefrom. Thus, incorporating magnesium carbonate in the composition itself may negatively affect nicotine release therefrom, in particular at the concentrations of magnesium carbonate that would be necessary to obtain a sufficient pH stabilizing effect on oral pH during an extended period of oral use. As is demonstrated in the experimental section, a magnesium carbonate concentration in the composition in the region of 10% of the total weight of the oral smokeless tobacco or nicotine-containing non-tobacco product would be needed to obtain suitable pH stabilization during an extended period of oral use (see Figure 1). However, such concentration would reduce nicotine mobility within the oral smokeless tobacco or nicotine-containing non-tobacco product, and impair the production process regarding product composition and pouch filling capability (due to product rheology changes). Moreover, the tobacco product's sensory characteristics (e.g. taste) would be impaired.

It has now surprisingly been found that it is possible to provide magnesium carbonate to the wrapping material and/or liner in order to stabilize the oral pH during use of an oral smokeless tobacco or nicotine-containing non-tobacco product. A magnesium carbonate concentration in
the region of 2% in or on a wrapper or liner would give better or equal effect on oral pH stabilization as 10% magnesium carbonate in the tobacco composition, counted on the total weight of the oral smokeless tobacco or nicotine-containing non-tobacco product, without the negative effects on e.g. manufacturing and taste (see comparison in Figure 1). This despite the fact known by the skilled person that magnesium carbonate has a low solubility (in aqueous solvents such as water and saliva) in comparison to the pH adjusters commonly used in smokeless tobacco or non-tobacco products, such as sodium carbonate and sodium bicarbonate, and thus would not be expected to provide such a high pH stabilizing effect in the oral cavity.

The magnesium carbonate in the wrapping material and/or liner as disclosed herein stabilizes the oral pH during oral use of the product so that the pH in close proximity to the mucous membrane (i.e. the oral pH) does not drop significantly during use of the product. The drop in pH during use of a smokeless tobacco or non-tobacco product is most pronounced in the immediate vicinity of the product where the product is in contact with the tissue in the oral cavity. Magnesium carbonate present in the wrapping material and/or liner as disclosed herein prevents this drop in pH and stabilizes the pH at a level which facilitates nicotine uptake, as a drop in pH otherwise would lower nicotine uptake.

Hence, there is provided an oral smokeless tobacco product comprising a tobacco composition enclosed by a wrapping material said product optionally containing a liner adjacent to the wrapping material inside the pouch, wherein the wrapping material and/or liner comprises a magnesium carbonate. In line with the reasoning above, there is also provided an oral smokeless nicotine-containing non-tobacco product comprising a composition enclosed by a wrapping material said product optionally containing a liner adjacent to the wrapping material inside the pouch, wherein the wrapping material and/or liner comprises a magnesium carbonate.

The composition of a nicotine-containing non-tobacco product may consist of or comprise non-tobacco plant fibers, microcrystalline cellulose and/or other filler materials, and nicotine or derivatives of nicotine, and water.

When higher amounts of magnesium carbonate are added to the wrapping material or liner, the magnesium carbonate is preferably granulated. The person skilled in the art is well equipped to understand how to granulate magnesium carbonate.

Oral smokeless tobacco or nicotine-containing non-tobacco products according to the invention provide efficient nicotine delivery over time due to the magnesium carbonate present in the wrapping material and/or liner, whereby time of use in the oral cavity may be extended.
This may be a considerable advantage, in view of change of consumer use preferences. Extended times of exposure of the oral smokeless tobacco or nicotine-containing non-tobacco product also enhances the importance of the basic surface pH, in view of oral and/or dental health.

An advantage with using magnesium carbonate to stabilize the oral pH during use of a smokeless oral tobacco or nicotine-containing non-tobacco product is that the risk of burns caused by the pH increasing agent is reduced as compared to if more easily dissolvable basic salts, such as sodium carbonate or sodium bicarbonate, would be used instead. Without wishing to be bound by theory, this can be due to that the magnesium carbonate does not cause such a rapid increase in pH during dissolution as other more easily dissolvable basic salts do. As mentioned elsewhere herein, such basic salts are commonly used in oral smokeless tobacco compositions to adjust the pH therein. Also, the use of magnesium carbonate instead of more easily dissolvable basic salts decreases the risk for discoloring of the wrapping material (the pouch material) as the more easily dissolvable basic salts, such as sodium carbonate and sodium bicarbonate, are hygroscopic and tend to draw moisture from the tobacco or non-tobacco composition which may lead to the pouch material becoming discolored and sticky. This is in particular a problem with so called white pouched tobacco or non-tobacco products. Further, as magnesium carbonate is a carbonate which is difficult to dissolve, it will be consumed much more slowly during storage than a more easily dissolvable basic salt, thus providing a more prolonged effect on pH stabilization. In addition, during oral use of an oral smokeless tobacco or nicotine-containing non-tobacco product, saliva will move into the tobacco or non-tobacco material as this has a higher salt concentration than the saliva. If more easily dissolvable carbonates would be use in the wrapping or liner material, these would then move together with the saliva into the tobacco or non-tobacco material. This would abolish the pH stabilizing effect at the surface of the product where it is in contact with the oral mucosa and thus not lead to the beneficial effects on nicotine uptake. As magnesium carbonate dissolves more slowly in saliva it will on the other hand stay at the surface of the product and beneficially stabilize the oral pH and thus favour the nicotine uptake in the oral cavity. More easily dissolvable carbonates, such as sodium carbonate or sodium bicarbonate would therefore not be suitable for stabilizing the oral pH of a user of an oral smokeless tobacco or non-tobacco product.

A lower pH of the smokeless tobacco or nicotine-containing non-tobacco composition means that nicotine can move more freely in the oral smokeless tobacco or nicotine-containing non-tobacco product (see Figure 2). Although Figure 2 relates to snus, the results would be analogous for snuff products in general (such as American snuff), and chewing tobacco, as well as for oral nicotine-containing non-tobacco products.
In most oral smokeless tobacco or nicotine-containing non-tobacco products the prevailing
procedure is to add a pH-modifying substance to the composition in order to increase its pH
and thus nicotine uptake by the mucous membrane. By having a lower pH in the composition
and apply magnesium carbonate in or on the wrapper or liner, nicotine may more freely move
to the site of uptake, at which site magnesium carbonate raises the pH to improve the nicotine
permeability through the mucous membrane. As regards oral smokeless tobacco products, an
increased permeability for nicotine through the mucous membrane means that the amount of
tobacco in the tobacco composition may be reduced. As a result of such reduction, there would
follow a reduction of harmful constituents and by-products. It may moreover lead to cost
savings.

A further advantage provided of not incorporating magnesium carbonate in the composition of
an oral smokeless tobacco or nicotine-containing non-tobacco product, or reducing the amount
of magnesium carbonate therein, is that a lower pH reduces nicotine oxidation and
evaporation. In addition, a lower pH will also provide improved flavor stability. The
aforementioned shall however not be understood as meaning that it is always advantageous to
dispense with magnesium carbonate in the composition. On the contrary, the present invention
may well be combined with a composition comprising magnesium carbonate.

If it is determined from e.g. a production standpoint to incorporate a suboptimal magnesium
carbonate concentration in or on the wrapping material or liner, this may be compensated for
by magnesium carbonate addition to the composition. This is possible, in accordance with the
invention, since magnesium carbonate acts mainly as a pH stabilizer and only has a minor
effect on the pH, due to its low solubility.

The wrapping material may comprise magnesium carbonate in an amount of at least 0.1%,
such as 0.1% to 10%, by total weight of the oral smokeless product. Figure 1 shows that an
oral smokeless tobacco product with a wrapping material comprising magnesium carbonate is
5-10 times more effective compared to an oral smokeless tobacco product with magnesium
carbonate added to the tobacco composition, as regards oral pH stabilization. Experiments
have shown that the pH-modifying effect of a magnesium carbonate starts at a concentration
of 2%, when the magnesium carbonate is mixed with the tobacco composition. Hence, an
amount lower than 0.1% (by total weight of the oral smokeless tobacco product) in or on the
wrapper is not likely to be used. The upper addition level is limited by the manufacturing
method and probably also by a saturation effect, whereby the magnesium carbonate will not
dissolve further. At high amounts of magnesium carbonate, the magnesium carbonate is
preferably granulated. The person skilled in the art is well equipped to understand how to
granulate magnesium carbonate. The above reasoning also holds true for oral nicotine-containing non-tobacco products in accordance with the invention.

As an alternative solution to the above pH stabilization problem during use, an oral smokeless tobacco or nicotine-containing non-tobacco product comprising a composition enclosed by a wrapping material is provided, said product comprising a liner adjacent to the wrapping material, wherein the liner comprises magnesium carbonate in an amount of at least 0.1%, such as 0.1% to 10 %, by total weight of the oral smokeless product. Said composition may be a tobacco composition or a nicotine-containing non-tobacco composition.

As described herein, the statement "the wrapping material and/or liner comprising magnesium carbonate" should be understood as magnesium carbonate being present in or on (the inside and/or outside) the wrapping material and/or liner.

The amount of magnesium carbonate may be present in or on a wrapping material or liner in the interval from about 0.3 to 8 , 0.5 to 7 , 0.7 to 6 , 0.5 to 4 , 1.5 to 2.5%, or 1 to 3% by total weight of the oral smokeless tobacco or nicotine-containing non-tobacco product. The amount of magnesium carbonate in or on the wrapping material or liner may be created from low and high endpoints chosen from the following: 0.1, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10% by total weight of the oral smokeless product. An amount of magnesium carbonate below 0.1% by total weight of the product would not give adequate effect on nicotine extraction, whereas an amount exceeding 10% by total weight of the product would not further improve the nicotine extraction, if the magnesium carbonate is not granulated. If the magnesium carbonate is present in both the wrapping material and the liner, the amount of magnesium carbonate in the wrapping material and liner, may be decreased so that the total amount of magnesium carbonate in the product (i.e. the total amount in the wrapping material and the liner) is in the range of the amounts according to the above.

The above amounts of magnesium carbonate in or on a wrapper or liner are based on in vivo nicotine extraction data. Herein, an approximation of nicotine uptake has been obtained by analyzing nicotine extraction from used pouches (see "Measurement of in vivo nicotine extraction", below).

In all instances when % by weight of the oral smokeless product, e.g. the oral smokeless tobacco product, is referred to herein, reference is made to moist products, as provided on the market (unless defined otherwise). The water content of the oral smokeless tobacco product may be 2-55% by total weight of the oral smokeless product. This corresponds to a moisture content of approximately 2-60% by total weight of the oral smokeless tobacco product. The moisture content of the smokeless tobacco composition may further be within the range of
from 10 to 60% w/w, such as within the range of from 15 to 60% w/w, 20 to 60% w/w, 20 to
58% w/w, 30 to 56% w/w or 40 to 54% w/w. The difference between water and moisture
content is that the latter also includes other oven volatile compounds, such as propylene glycol
and/or glycerol.

The tobacco or nicotine-containing non-tobacco composition of the oral smokeless tobacco
product may be devoid of any added magnesium carbonate. This commonly translates to an
amount of magnesium carbonate in the tobacco composition of the oral smokeless tobacco
product of 0.1-1% by weight of the tobacco composition, by way of endogenously produced
magnesium carbonate from the constituent parts of the tobacco and additives provided.

There is also provided an oral smokeless tobacco or nicotine-containing non-tobacco product
comprising magnesium carbonate in its wrapping material and/or liner, wherein the
composition comprises magnesium carbonate in an amount from 1-5% by weight of the
composition.

In view of the above, the magnesium carbonate present in a tobacco composition, as
elaborated on in WO2009/082331, may be combined with the present invention. By way of
example, magnesium carbonate in the tobacco composition or the nicotine-containing non-
tobacco composition may support the nicotine uptake regulation provided by magnesium
carbonate in the wrapping material and/or liner. It should be remembered, however, that
magnesium carbonate present in the wrapper and/or liner still provides controlled nicotine
uptake through the mucous membrane, and reduces production related problems, irrespective
of magnesium carbonate present in the tobacco composition, as applicable. The key is the
improved regulation of nicotine uptake, at reduced amounts of magnesium carbonate in the
tobacco composition, as compared with tobacco compositions disclosed in e.g. WO2009/082331.
The same reasoning holds true for nicotine-containing tobacco-free
products.

The wrapping material and/or liner of the oral smokeless product according to the present
invention may comprise or consist of cellulose, derivative(s) of cellulose, synthetic fibers,
binders or combinations thereof.

The liner may be made of material which does not dissolve upon oral use of the oral
smokeless tobacco or non-tobacco product, i.e. a material which is not water-soluble.
Alternatively, the liner may be made of a material which is water-soluble so that the liner is
dissolved upon oral use of the product. The liner, when present, is preferably provided
separately from the wrapping material so that the wrapping material does not comprise a liner
comprising magnesium carbonate, i.e. the liner does not form part of the wrapping material.
The liner may be small and only cover a small part of the space (area) between the wrapping material and the tobacco or nicotine-containing non-tobacco composition or it may cover a larger part of this space, such as 1-100%, 1-50%, 10-50%, or 10-20%.

Magnesium carbonate may be provided in or on the wrapper or liner by way of spraying, dipping, dusting, coating or chemical incorporation. The magnesium carbonate may be provided to the wrapping material and/or liner by using a binder as disclosed elsewhere herein. The liner may consist of or comprise a water soluble composition. Moreover, the liner may be in the form of a dyestuff or varnish. Application may be effected during manufacturing of wrapping/liner material, or application may be on the finished wrapping/liner material or in connection to product manufacturing. For example, the magnesium carbonate may be chemically bound to a wrapping material or liner by dipping the wrapping material or liner in a mixture of water and magnesium hydroxide, and by applying an air flow, magnesium carbonate can be formed through a reaction with carbon dioxide. The wrapping material may also be first dipped in a concentrated solution of magnesium chloride followed by dipping in a concentrated solution of sodium carbonate in order to provide the magnesium carbonate to a wrapping material or liner.

In order to facilitate the production, it may be preferred to add the magnesium carbonate to the wrapping material.

The magnesium carbonate may be applied on the outer surface of the wrapping material and/or liner, for the magnesium carbonate to be located as closely as possible to the mucous membrane during use. The magnesium carbonate may additionally or alternatively be provided on the inside of the wrapping material and/or liner and/or incorporated (embedded) in the wrapping material and/or liner.

Magnesium carbonate may be provided in or on the wrapper or liner by use of a binder. The purpose of the binder is to lightly adhere the magnesium carbonate to the wrapper or liner, but still provide a quick release at contact with the mucous membrane. Thus, the concentration of the binder should be as low as possible, while still ensuring magnesium carbonate dry loss at manufacturing, transport and storage.

The binder may be a water-soluble polymer, such as one or more of PVA, PVP, HPC, HPMC, CMC, acacia gum or other easily water dissolvable substances. For preparation of a magnesium carbonate-binder mixture, the binder may be dissolved in water or ethanol or a combination thereof. The wrapping material and/or liner may thus comprise magnesium carbonate and a water-soluble polymer, such as one or more of PVA, PVP, HPC, HPMC, and CMC.
The optimum concentration of the binder in the mixture may vary according to type of binder, solvent, way of application and amount of magnesium carbonate applied. For PVA the preferred concentration of binder in water solution is approximately 8-12% (by weight).

The magnesium carbonate in or on the wrapping material or liner may be in the form of hydroxide(s), oxide(s), and/or water of crystallization. The magnesium carbonates may be divided into two classes: magnesium carbonate, MgCO$_3$, and magnesium hydroxyl carbonate (MgCO$_3$y(OH)$_z$.XH$_2$O). In both of these classes there are also compounds without crystal water (X=0) and compounds with the same formula but different crystal structure. Y and Z are known to the person skilled in the art to be variable. Neither X nor Y need to be an integer. Y may moreover be 0 for an additive to the composition for \textit{in situ} generation of magnesium carbonate. Some of the compounds are naturally occurring minerals, whereas others have to be manufactured. The group consists of more than 35 different compounds, all with their own individual CAS-number. All of these compounds may be useful in the products disclosed herein.

In some embodiments of the present document, the magnesium carbonate may not be used with an acid in an acid/base pair.

The oral smokeless tobacco product may be oral snuff or chewing tobacco, and the oral smokeless nicotine-containing non-tobacco product may be in a form resembling any of the aforementioned products. The product may contain gum, e.g. gum arabicum, and hence be similar to a chewing gum in consistency. The snuff product may be snus (commonly called Swedish type snuff), or in a form resembling snus. The product may be moist snuff. The product may be contained in a box, can or canister. The oral smokeless tobacco or nicotine-containing non-tobacco composition, as enclosed by the wrapper, may be in particular form or pre-formed.

The oral smokeless tobacco product comprises tobacco material comprising tobacco leaves or parts of leaves, such as lamina and stem. The leaves and parts of leaves may be whole and/or finely divided (disintegrated), such as ground, cut, shredded, and/or threshed. The tobacco may further be cured, aged, fermented or treated in any other way, such as granulated or encapsulated, and the parts of leaves may be blended in defined proportions in the tobacco material.

The oral smokeless nicotine-containing non-tobacco product as disclosed herein comprises a nicotine-containing non-tobacco composition comprising a particulate non-tobacco material comprising nicotine or a salt thereof (e.g. nicotine bitartrate) and one more fillers, such as polysaccharides (e.g. maltitol or mannitol) and/or microcrystalline cellulose. Alternatively, or in
addition, the nicotine-containing non-tobacco composition may comprise non-tobacco plant material such as non-tobacco plant fibres, in particular dietary plant fibers, such as maize fibers, oat fibres, tomato fibers, barley fibers, rye fibers, apple fibres, sugar beet fibres, potato fibres, corn fibres, buckwheat fibres, cocoa fibres, bamboo fibers, citrus fibers and any combinations thereof and added nicotine or a salt thereof (such as nicotine bitartrate). Such substances used for the nicotine-containing non-tobacco composition may also be added to a smokeless tobacco composition in addition to tobacco.

The oral smokeless tobacco composition or oral smokeless nicotine-containing non-tobacco composition as disclosed herein may, in addition to the tobacco material, such as divided tobacco material, and non-tobacco material, respectively, comprise water, salt (e.g. one or more of sodium chloride, potassium chloride, magnesium chloride, calcium chloride and any combinations thereof), pH adjuster (e.g. one or more of sodium hydroxide, potassium hydroxide, potassium carbonate, sodium carbonate, sodium bicarbonate or magnesium carbonate), and optionally one or more additional ingredients, such as flavouring agents, cooling agents, heating agents, sweetening agents, colorants, humectants (e.g. propylene glycol or glycerol), antioxidants, preservatives (e.g. potassium sorbate), binders, fillers, non-tobacco plant fibers and disintegration aids.

Salt, such as sodium chloride, potassium chloride, magnesium chloride, calcium chloride and any combinations thereof, may be added to a smokeless tobacco or nicotine-containing non-tobacco composition mainly for its taste enhancing properties, but it also has a preservative effect which contributes to improved shelf life of the product. Salt, such as sodium chloride lowers the water activity of the products, thus preventing micro-organisms from growing. Normally, the amount of added salt in the smokeless tobacco or nicotine-containing non-tobacco composition is within the range of from about 0.5 to about 10% w/w based on dry weight of the smokeless tobacco nicotine-containing non-tobacco composition.

pH adjusters, such as sodium carbonate or sodium bicarbonate, brings the pH value to the slightly alkaline side, such as about pH 8 to 9, and may be added to the tobacco or nicotine-containing non-tobacco composition. Sodium carbonate may also be used to give the products their characteristic aroma profile. Typically, the amount of pH adjuster in the smokeless tobacco composition is less than about 7% w/w, such as within the range of from about 3 to about 5% w/w, based on dry weight of the tobacco or nicotine-containing non-tobacco composition. The products may also be devoid of any added pH adjusters in the tobacco or nicotine-containing non-tobacco composition.
The pH tobacco or nicotine-containing non-tobacco composition of the oral smokeless tobacco or nicotine-containing non-tobacco product may be about 6-9. A pH of about 8-9 is particularly advantageous for Swedish snus. The pH tobacco or nicotine-containing non-tobacco composition of the oral smokeless tobacco or nicotine-containing non-tobacco product may alternatively be about 6-8, such as about 7.5-8 or about 7.7-7.9. Such a pH is particularly advantageous for American snuff.

Humectants, such as propylene glycol or glycerol, may also be added to protect the product from drying out and may also have a preservative effect since the water activity of the product will be lowered, thereby preventing microorganisms from growing. Normally, the amount of humectant in the smokeless tobacco composition is within the range of from about 5 to about 15% w/w based on dry weight of the smokeless tobacco or nicotine-containing non-tobacco composition.

Flavours used are generally natural or nature identical compounds that comply with food regulations. Flavours are usually dissolved in a solvent, such as ethanol, when added.

Typically, the amount of tobacco in the smokeless tobacco composition is within the range of from about 40 to 80% w/w based on dry weight of the smokeless tobacco.

The present document is also directed to the use of magnesium carbonate in a wrapping material and/or liner of an oral smokeless tobacco or a nicotine-containing non-tobacco product for stabilizing the oral pH during use of said product.

The present document is also directed to a method for the in situ formation of magnesium carbonate in a wrapping material and/or an optional liner of an oral smokeless tobacco or nicotine-containing non-tobacco product comprising a composition enclosed by said wrapping material thereby forming a pouch, said method comprising providing an aqueous polymer-containing solution comprising magnesium carbonate to said wrapping material and/or optional liner.

The invention shall now be described more in detail with reference to the below examples and figures, which shall however not be seen as limiting the scope of the invention in any way whatsoever.
EXPERIMENTAL SECTION

MEASUREMENTS

Measurement of pH in the oral cavity

Instrumentation.

The instrumentation consisted of an Ingold Glass pH Catheter M3 from SynMed U.K. (sub-manufactured by Mettler-Toledo), connected to an Orion 5 star pH-instrument from Thermo Scientific. The measurements were captured directly to Microsoft Excel using WinWedge data collection software.

Calibration.

Before the measurements started the pH-electrode was calibrated at ambient temperature with three certified buffer solutions (4.01; 7.01 and 10) from Thermo Scientific. The measurement temperature was then adjusted to 35 °C to emulate the temperature in the oral cavity.

Sample preparation.

The pH-electrode was fastened to the outside of the snus-pouch while ensuring that both the measurement cell and the reference cell were confined within the pouch area.

Measurements.

Oral pH 1: The subjects of the experiments had abstained from any form of tobacco-use for at least 30 minutes prior to the experiments. The pH-instrument was switched from continuous to timed sampling with a frequency of one measurement per minute. The pouch was placed in the mouth between the upper lip and the gum. Particular care was taken to ensure that the pH-electrode remained stationary during the measurements and the subjects were instructed to remain as immobile as possible. The experiments typically lasted for 30 minutes.

Oral pH 2: An alternative procedure to measure the oral pH was also carried out; the pH-electrode was placed on the tongue and pH measured with one second intervals until a stable reading was obtained. A snus pouch was then placed on the tongue (time = 0) and the pH-measurements continued for 200 seconds.
Measurement of *in vivo* nicotine extraction

**Procedure**

The subjects of the experiments had abstained from any form of tobacco-use for at least 30 minutes prior to the experiments. The pouches were used randomly under standardized conditions as follows: One portion was placed and kept in the same place in the oral cavity between the upper lip and the gum for 30 minutes. The subjects were instructed to keep the pouch as still as possible. After completion, the pouches were stored in a freezer prior to analysis. For each trial five unused pouches were used as reference.

**Analysis**

All pouches were analyzed for nicotine using a CORESTA GC-method (CORESTA Recommended Methods No 62. Determination of Nicotine in Tobacco and Tobacco Products by Gas Chromatographic Analysis; Determination of Nicotine in Tobacco (Beitrage zur Tabakforschung 2001, 19, 251-265); Analysis of Minor Alkaloids in Tobacco (Beitrage zur Tabakforschung International 2005, 21, 369-379)).

**Calculation**

The extraction rate was calculated by comparing the remaining amount of nicotine in used pouches with unused pouches.

**Oral pH in commercially available snus products.**

The oral pH in five commercially available snus products was measured with the method denoted as Oral pH 1.

**Application of magnesium carbonate**

Experiments in which magnesium carbonate was chemically bound to wrapping material were performed. In the first test, wrapping material (pouch paper) was dipped in a mixture of water and magnesium hydroxide, and by applying an air flow magnesium carbonate was formed through a reaction with carbon dioxide. The formed amount of magnesium carbonate corresponded to about 30 mg per 0.9 g pouch. Pouches were made and filled with commercially available snus. Measurement with the Oral pH 1 method on two subjects showed that pH was stabilized over 7 compared to 6.5 for the reference sample. In a second test, wrapping material (pouch paper) was first dipped in a concentrated solution of magnesium chloride followed by dipping in a concentrated solution of sodium carbonate. After careful
washing and drying, the material was weighted and the amount of magnesium carbonate was calculated. The formed amount of magnesium carbonate corresponded to approximately 10 mg per 0.9 g pouch.

Example A.

Example A comprises a snus pouch where the pouch paper material (wrapping material) has been applied with magnesium carbonate. Commercially available snus with a moisture content of approximately 55 % and with a pH value of 7.95, as measured with the FDA recommended method (Federal Register, Vol. 74, No 4, s.712-719 Wednesday, January 7, 2009), was used in the example. Sodium carbonate at a level of 2.5 % (w/w) was used as pH adjuster. The magnesium carbonate mixture was prepared as follows; a solution of 500 ml water and 6 g of the binder PVA (Poly vinyl alcohol, 363073, Aldrich) was mixed thoroughly, followed by blending 200 ml of the solution with 20 g of magnesium carbonate (Magnesium carbonate basic, Ph Eur, Fluka Chemika).

Pouches were prepared by dipping empty wrapping material (pouch paper) in the carbonate mixture. After drying, pouches containing approximately 15 mg magnesium carbonate per pouch were selected, said amount corresponding to approximately 2 % magnesium carbonate by weight per pouch (total wet weight of end product). The pouches were filled with 0.65 g of snus and heat sealed. The reference material consisted of snus from the same batch, filled in pouches without magnesium carbonate.

Two test subjects used four tobacco-filled pouches each (two samples and two references) and the oral pH was measured with the method described above (Oral pH 1) and the average pH-values were calculated. The experiment shows (Figure 1 and 4) that the oral pH is significantly higher for an oral smokeless tobacco product with a wrapping material applied with magnesium carbonate, compared with tobacco-filled pouches devoid of added magnesium carbonate.

The oral pH was also measured according to Oral pH 2. The average pH-values from 4 products with wrapping material comprising magnesium carbonate (sample) and 4 reference tobacco-filled pouches were calculated. The result clearly shows that the pH in the sample stabilizes at a higher level compared with the reference and that the difference in pH using this method is approximately 0.4 pH-units.
Example B.

The procedure was exactly the same as in example A, except that the snus had a pH-value of 8.65 as measured with the FDA recommended method (Federal Register, Vol. 74, No 4, s.712-719 Wednesday, January 7, 2009). Sodium carbonate at a level of 2.5 % (w/w) was used as pH adjuster. Figure 3 shows that the oral pH 1 is significantly higher for oral smokeless tobacco products with wrapping material applied with magnesium carbonate, compared to tobacco-filled pouches without any added magnesium carbonate. This is the same result as in example A.

In another embodiment the in vivo extraction of nicotine was measured. Five subjects used five oral smokeless tobacco products of each type (with magnesium carbonate added to the wrapping material and devoid of added magnesium carbonate, respectively). The procedure described in "Measurement of in vivo nicotine extraction" above was followed. After completion, the oral products were analyzed for nicotine and the extraction rate was calculated.

Based on the average extracted amount of nicotine, it was concluded that the extraction rate increased from 22 % to 29 %, for oral smokeless tobacco products with magnesium carbonate added to the wrapping material. This corresponds to an extraction increase of approximately 33 %.

Example C

Example C constitutes a filled snus pouch comprising a rectangular piece of wrapping material functioning as liner, the liner being applied with magnesium carbonate and placed on the inside of the wrapping material, hence covering the snus.

In the experiment, snus with a moisture content of approximately 30 % and a pH of 8.7 was used. Sodium carbonate at a level of 2.3 % (w/w) was used as pH adjuster.

The liner was prepared by dipping a 58x15 mm pouch paper (wrapping material) piece in a slurry consisting of 100 ml water and 15 g of magnesium carbonate (Magnesium carbonate basic, Ph Eur, Fluka Chemika). The liners were dried on a metal grid followed by weight selection to obtain liners with approximately 20 mg magnesium carbonate per liner, corresponding to approximately 2 % magnesium carbonate by total wet weight of the oral smokeless tobacco product. The tobacco-filled pouches were hand made by insertion of the liner under the wrapping material and addition of 0.9 g snus. As references, tobacco-filled
pouches with and without liners, respectively, neither liners nor wrappers comprising any magnesium carbonate, were used.

In the in vivo extraction trial, two subjects used five tobacco-filled pouches of each type. The procedure described in "Measurement of in vivo nicotine extraction" above was followed. The results show that the extraction rate for the tobacco-filled pouches containing a liner without magnesium carbonate decreased by 5% compared to a reference pouch without a liner. It was concluded that the liner itself prevents nicotine extraction. However, the results also showed that the extraction rate increased by 15% for oral smokeless tobacco products comprising liners applied with magnesium carbonate, as compared with tobacco-filled pouches with liners devoid of added magnesium carbonate.

It is to be understood that while the invention has been described in conjunction with the detailed description thereof, the foregoing description is intended to illustrate and not limit the scope of the invention, which is defined by the scope of the appended claims. Other aspects, advantages, and modifications are within the scope of the following claims.

Unless expressly described to the contrary, each of the preferred features described herein can be used in combination with any and all of the other herein described preferred features.
CLAIMS

1. An oral smokeless tobacco or nicotine-containing non-tobacco product comprising a composition enclosed by a wrapping material forming a pouch and optionally a liner adjacent to the wrapping material inside the pouch, wherein the wrapping material and/or liner comprises magnesium carbonate in an amount of at least 0.1% by total weight of the oral product.

2. The oral smokeless tobacco or nicotine-containing non-tobacco product according to claim 1, wherein the wrapping material and/or liner comprises magnesium carbonate in an amount of 0.1 to 10% by total weight of the oral product.

3. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of the preceding claims, wherein the wrapping material and/or liner comprises magnesium carbonate in an amount of 0.5-4% by total weight of the oral product.

4. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of the preceding claims, wherein the wrapping material and/or liner comprises magnesium carbonate in an amount of 1-3% by total weight of the oral product.

5. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of the preceding claims, wherein the magnesium carbonate is applied on the outer or inner surface of the wrapping material and/or liner.

6. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of the preceding claims, wherein the magnesium carbonate is applied on the outer surface of the wrapping material and/or liner.

7. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any of the preceding claims, wherein the wrapping material and/or liner comprises or consists of cellulose, derivative(s) of cellulose, synthetic fibers or combinations thereof.

8. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any of the preceding claims wherein the pH of the composition is about 8-9.

9. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any of claims 1-7, wherein the pH of the composition is about 6-8, such as about 7.5-8 or about 7.7-7.9.

10. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of the preceding claims, wherein said composition comprises one or more pH-adjusters.

11. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of claims 1-9, wherein said composition does not comprise any added pH-adjusters.
12. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of the preceding claims, wherein the composition does not comprise any added magnesium carbonate.

13. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of claims 1-10, wherein the composition comprises magnesium carbonate in an amount from 0.1-1% by weight of the composition.

14. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of claims 1-10, wherein the composition comprises magnesium carbonate in an amount from 1-5% by weight of the composition.

15. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of the preceding claims, wherein the magnesium carbonate contains hydroxide(s), oxide(s), and/or water of crystallization.

16. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any of the preceding claims, wherein the product is snuff or chewing tobacco, or is in a form resembling snuff or chewing tobacco.

17. The oral smokeless tobacco or nicotine-containing non-tobacco product according to claim 16, wherein the product is snus, or is in a form resembling snus.

18. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of the preceding claims, wherein the water content is 2-55% by total weight of the oral product.

19. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of claims 1-18, wherein the moisture content is 10 to 60% w/w, 15 to 60% w/w, 20 to 60% w/w, 20 to 58% w/w, 30 to 56% w/w or 40 to 54% w/w.

20. The oral smokeless tobacco or nicotine-containing non-tobacco product according to claim 19, wherein the composition is moist snuff.

21. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of the preceding claims, wherein said liner is water-soluble.

22. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of claims 1-20, wherein said liner is not water-soluble.

23. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of claims 1-21, wherein the wrapping material comprises magnesium carbonate and a water-soluble polymer.

24. The oral smokeless tobacco or nicotine-containing non-tobacco product according to claim 23, wherein the water-soluble polymer is one or more of PVA, PVP, HPC, HPMC, CMC.
25. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any one of the preceding claims, wherein the oral smokeless tobacco or nicotine-containing non-tobacco product is non-post-moisturized.

26. The oral smokeless tobacco or nicotine-containing non-tobacco product according to any of the preceding claims, which product is contained in a box, can or canister.

27. Use of magnesium carbonate in a wrapping material and/or liner of an oral smokeless tobacco or a nicotine-containing non-tobacco product for stabilizing the oral pH during use of said product.

28. A method for the *in situ* formation of magnesium carbonate in a wrapping material and/or an optional liner of an oral smokeless tobacco or nicotine-containing non-tobacco product comprising a composition enclosed by said wrapping material thereby forming a pouch, said method comprising providing an aqueous polymer-containing solution comprising magnesium carbonate to said wrapping material and/or optional liner.
**Figure 1**

- **MgCO3 in wrapping material, 2% (w/w) of the whole product**
- **MgCO3 in bulk, 10% (w/w) of the whole product**
- **no MgCO3**

The graph shows the pH over time for different conditions of MgCO3 presence and in the absence of MgCO3. The pH values range from 6 to 8, and the time is measured in minutes from 0 to 30.
Figure 2

Mobility of nicotine at different pH values
Figure 3

The graph shows the pH over time for two samples: a reference sample and a sample. The pH decreases over time, with the reference sample showing a slightly steeper decline compared to the sample. The pH values range from 6 to 8, with the reference sample starting at approximately 7.5 and the sample starting at around 6.5.
Figure 4
A. CLASSIFICATION OF SUBJECT MATTER

INV. A24B13/00 A24F23/02
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24B A24F

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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:
  * "A" document defining the general state of the art which is not considered to be of particular relevance
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  * "P" document published prior to the international filing date but later than the priority date claimed

Date of the actual completion of the international search: 11 August 2015

Date of mailing of the international search report: 18/08/2015

Name and mailing address of the ISA:
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Authorized officer:
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