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(54) **SMOKELESS ARTICLE**

(57) A smokeless article for oral consumption comprising a pouch is described. The pouch encloses a content which comprises nicotine-dosed non-tobacco plant

material fibres and a flavourant. The fibres have a particle size of up to 30 µm. The smokeless article may be used for the oral delivery of nicotine to a consumer.

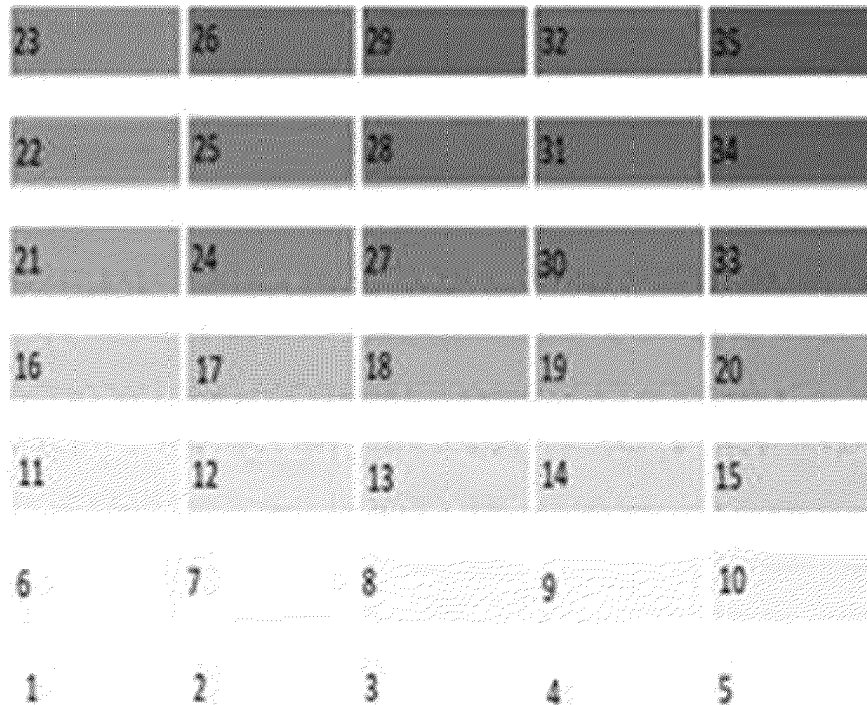


Figure 5

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Description**Field of the Disclosure**

5 **[0001]** The present disclosure relates to a smokeless article. In particular, the disclosure relates to a smokeless article comprising nicotine-dosed non-tobacco plant material fibres and a flavourant; wherein the plant material fibres have a particle size of up to 30 μm .

Background

10 **[0002]** Smoking is generally considered to expose a smoker to potentially harmful substances. It is generally thought that the majority of the potentially harmful substances are formed by the heat generated during burning (combustion) of the article. There is interest in so-called heat not burn products, which heat a tobacco or similar substrate at a lower temperature than a conventional cigarette. These products are usually described as less harmful than conventional
15 cigarettes. Both conventional cigarettes and heat not burn products are visible during use and produce smoke or vapour.

[0003] As a result of these considerations and because of consumer preferences, it is desirable to find and improve alternative substance delivery routes that continue to meet user expectations. Smokeless articles are a suitable alternative because they do not require heating for substance delivery to the user. Instead, smokeless articles rely on saliva to extract soluble substances, typically nicotine and/or flavours, from tobacco contained within the smokeless article.

20 **[0004]** Conventional smokeless articles have a saliva permeable pouch housing a content. The content is generally in the form of tobacco, said tobacco containing a soluble element, typically nicotine. Such a product may be referred to as portion snus. It is typically provided as prepackaged (traditionally moist) powder in small teabag-like pouches. Each pouch is a single portion or unit. This moistened product may be referred to as original snus.

25 **[0005]** Smokeless articles are placed in the mouth where saliva extracts the soluble element from the tobacco contained within. Typically, the smokeless article is placed in the oral cavity, sublingually or in the oral vestibule (between the teeth and lips/cheeks). The user may assist extraction by oral manipulation, such as by chewing and/or sucking or pressing on the outside of the mouth to squeeze the pouch.

30 **[0006]** The resulting saliva, which contains extracts, subsequently contacts a mucous membrane in the mouth, or at another point of the gastrointestinal tract, to deliver the soluble element across the membrane and into the bloodstream. The soluble element is then transported by the bloodstream to the site of action. For example, nicotine is delivered to the brain where it acts upon acetylcholine receptors.

[0007] The above described extraction and delivery process continues until the soluble element is depleted from the smokeless article. The smokeless article must then be removed from the mouth and disposed of.

35 **[0008]** Some commercially available smokeless articles contain snuff. Snuff is smokeless tobacco made from ground or pulverised tobacco leaves. Snuff is available in dry form or wet (moist) form. Moist snuff may be referred to as snus. Two common varieties of snus are Scandinavian snus and American snus. Both varieties of snus are available in a loose form, but are often contained within a saliva permeable pouch.

40 **[0009]** Typically, production of snus is achieved by grinding a blend of leaf tobaccos to specified particle sizes. The ground tobacco is then mixed with water and sodium chloride in closed process blenders. The mixture is subjected to a heat treatment, involving temperatures up to 80 - 100 °C, for several hours to pasteurize the snus. Thereafter, the snus is cooled and other ingredients may be added. Snus is typically manufactured to meet the GothiaTek® standard, as detailed in "Swedish snus and the GothiaTek® standard" (2005), Rutqvist, et al.

45 **[0010]** The World Health Organisation states that smokeless articles are considerably less hazardous than cigarettes. Action on Smoking and Health considers smokeless articles to be about one hundred times less harmful than cigarettes. Smokeless articles are therefore thought to provide a healthier alternative for smokers.

[0011] Smokeless articles containing snus may also contain one or more flavourants to enhance the user experience. Typical flavourants may include fruit or vegetable flavourants such as mint, blackcurrant or rhubarb. Unfortunately the presence of such flavourants may cause discoloration of the snus material. This is detrimental to the user experience, since consumers desire snus material which is white in colour and not discoloured, since this indicates a high quality
50 product to the user. Costly and inefficient bleaching steps may therefore be necessary during the manufacturing process to address the problem of discoloration due to the presence of flavourants and return the contents to a whiter colour which is more acceptable to the consumer. It would be desirable to provide smokeless articles which address this problem without the need for such bleaching during manufacture.

55 **[0012]** There is a need for improved design of smokeless articles to enhance the user experience and improve the function of its constituent components.

[0013] The present disclosure has been devised in the light of the above considerations.

Summary of the Disclosure

[0014] At its most general, the present disclosure relates to a smokeless article e.g. a snus article for oral use.

[0015] According to a first aspect, there is provided a smokeless article for oral consumption comprising a pouch enclosing a content, the content comprising nicotine-dosed non-tobacco plant material fibres and a flavourant; wherein the plant material fibres have a particle size of up to 30 μm .

[0016] It has been surprisingly found that when a flavourant is present in the content which would otherwise be expected to stain or discolour the content leading to an off-white appearance, this does not occur, or occurs to a lesser extent, when the content comprises plant material fibres having a particle size of up to 30 μm .

[0017] Without wishing to be bound by theory, it is believed that the discoloration of smokeless article content by a flavourant may be caused by a staining effect of esters present in the flavourant on the plant material. Esters are believed to result from the reaction of alcohol and carboxylic acid components of the flavourant. It seems that this staining effect is surprisingly reduced or eliminated when the plant material fibres have a particle size of up to 30 μm . This provides a product which is much more appealing to the consumer due to maintaining the white appearance of its content without the need for costly or inefficient additional bleaching steps during manufacture.

[0018] In some embodiments, the nicotine-dosed non-tobacco plant material fibres comprise or consist of one or more of nicotine-dosed wheat fibres and nicotine-dosed bamboo fibres. In some embodiments, the nicotine-dosed non-tobacco plant material fibres comprise or consist of nicotine-dosed wheat fibres. Particularly significant improvements in product whitening are observed for wheat fibres having a particle size of up to 30 μm .

[0019] In some embodiments, the flavourant is a flavourant which causes discoloration of nicotine-dosed non-tobacco plant material fibres when nicotine-dosed non-tobacco plant material fibres having a particle size of around 300 μm are contacted with the flavourant. The invention is effective at reducing or eliminating staining or discoloration in products containing flavourants which would otherwise be expected to stain or discolour the plant material when larger fibres are used. The nature of the flavourant is otherwise not limited. In some embodiments, the flavourant comprises or consists of one or more of a fruit flavourant and a vegetable flavourant. The fruit flavourant may comprise blackcurrant. The vegetable flavourant may comprise one or more of mint and rhubarb. In some embodiments, the flavourant comprises an alcohol component and a carboxylic acid component. As explained above, it is believed that such components may be responsible for the staining or discoloration of plant material, so the invention may be particularly effective when such flavourants are present. In some embodiments, the flavourant comprises an ester component or ester precursor components.

[0020] In some embodiments, the nicotine-dosed plant material fibres comprise a nicotinic compound selected from nicotine, nicotine salt(s), nicotine complex(es); and nicotine solvate(s). In some embodiments, the nicotinic compound is provided in a plant material. In some embodiments, the plant material is tobacco.

[0021] In some embodiments, the smokeless article is tobacco-free.

[0022] In some embodiments, the total nicotine content is from 5 to 15 mg, preferably about 10 mg.

[0023] The plant material fibres have a particle size of up to 30 μm . In some embodiments, the plant material fibres have a particle size of up to 29 μm , for example up to 28 μm , for example up to 27 μm , for example up to 26 μm , for example up to 25 μm or up to 20 μm . In some embodiments, the plant material fibres have a particle size of from 1 to 30 μm , for example from 2 to 30 μm , for example from 5 to 30 μm , for example from 10 to 30 μm , for example from 15 to 30 μm , for example from 20 to 30 μm , for example from 1 to 25 μm , for example from 2 to 25 μm , for example from 5 to 25 μm , for example from 10 to 25 μm , for example from 15 to 25 μm .

[0024] A second aspect of the invention is a method of improving the whiteness of a content of a smokeless article, wherein the smokeless article is for oral consumption and comprises a pouch enclosing the content, the method comprising the provision of nicotine-dosed non-tobacco plant material fibres and a flavourant within the content; wherein the plant material fibres have a particle size of up to 30 μm .

[0025] A third aspect is the use of plant material fibres have a particle size of up to 30 μm as a whitening agent in a smokeless article, wherein the smokeless article is for oral consumption and comprises a pouch enclosing a content, the content comprising the nicotine-dosed non-tobacco plant material fibres and a flavourant.

[0026] A fourth aspect of the invention is a process of manufacturing the smokeless article according to the first aspect, comprising the steps of;

(i) forming one or more sheets of pouch material around the contents; and

(ii) thermally or chemically sealing the pouch material to enclose the contents.

[0027] A fifth aspect of the invention is a kit comprising a plurality of smokeless articles according to the first aspect and a container.

[0028] As used herein, the term "particle size" when referring to plant material fibres such as bamboo or wheat fibres

indicates the maximum size of the longest dimension of the fibres. For example, a particle size of 50 μm indicates that in the population of fibres, the maximum fibre length is 50 μm .

5 [0029] Particles having the desired particle size may be obtained by passing a population of fibres through a sieve of corresponding mesh size. For example, to obtain fibres of particle size 300 μm (i.e. a maximum fibre length of 300 μm), a population of fibres are passed through a sieve with 300 μm diameter apertures in the mesh. In this way, fibres with a length of 300 μm or less pass through the mesh and fibres longer than 300 μm are retained by the mesh. The fibres which pass through the mesh may then be used in the smokeless article of the invention, having a particle size of 300 μm . Fibres of a desired particle size are also available from commercial suppliers such as Jelu-werk.

10 [0030] As used herein, the term "bamboo fibres" refers to natural fibres from plants of the Bambusoideae subfamily of the *Poaceae* family of grasses. The fibres may originate from any part of the plant, but in some embodiments may be originate from the stem of the plant. The fibres may be obtained from commercial sources such as JELUCEL® BF fibres sold by Jelu-werk, or may be prepared by grinding or milling plant material until fibers of the required particle size are obtained.

15 [0031] As used herein, the term "wheat fibres" refers to natural fibres from plants of the *Triticum* genus of grasses, for example *T. aestivum* (common wheat). The fibres may originate from any part of the plant, but in some embodiments may be originate from the stem of the plant. The fibres may be obtained from commercial sources such as JELUCEL® WF fibres sold by Jelu-werk, or may be prepared by grinding or milling plant material until fibers of the required particle size are obtained.

20 [0032] As used herein, the term "nicotine-dosed bamboo fibres" refers to a composition comprising bamboo fibres and a nicotinic compound. The nicotinic compound may be added to or mixed with the bamboo fibres prior to incorporation into the smokeless article. In some embodiments, the bamboo fibres are loaded into a suitable dryer, sprayed with a solution of nicotinic compound and dried to form nicotine-dosed bamboo fibres. The dryer may be a fluidised bed dryer. The solution may be a solution of nicotinic compound in glycerin. In some embodiments, the solution of nicotinic compound in glycerin may comprise from 10 to 50 wt% nicotinic compound based on the total solution weight, for example from 25 10 to 40 wt% or from 10 to 30 wt%.

30 [0033] As used herein, the term "nicotine-dosed wheat fibres" refers to a composition comprising wheat fibres and a nicotinic compound. The nicotinic compound may be added to or mixed with the wheat fibres prior to incorporation into the smokeless article. In some embodiments, the wheat fibres are loaded into a suitable dryer, sprayed with a solution of nicotinic compound and dried to form nicotine-dosed wheat fibres. The dryer may be a fluidised bed dryer. The solution may be a solution of nicotinic compound in glycerin. In some embodiments, the solution of nicotinic compound in glycerin may comprise from 10 to 50 wt% nicotinic compound based on the total solution weight, for example from 10 to 40 wt% or from 10 to 30 wt%.

35 [0034] As used herein, the term "discolour" or "discoloration" is intended to refer to a change in appearance in a product or sample from an initial relatively white appearance to an off-white appearance. The off-white discoloration may include colouring such as yellow, brown or pink/red, or grey.

40 [0035] As used herein, the term "flavourant" is intended to refer to any natural or synthetic material which is added to a smokeless article to impart the article with a flavour to enhance the user experience. Suitable flavourants include coffee, eucalyptus, menthol, liquorice, peppermint, spearmint, chocolate, fruit flavour (including e.g. citrus, cherry etc.), vanilla, spice (e.g. ginger, cinnamon) and tobacco flavour. The flavourant may be evenly dispersed throughout the contents or may be provided in isolated locations and/or varying concentrations throughout the contents. As used herein, the term "flavourant" denotes a compound having a desirable taste, aroma or both.

45 [0036] As used herein, the term "saliva" is intended to refer to the liquid substance formed in the mouth of animals, such as humans, that includes water, electrolytes and enzymes. Other components of saliva may include mucus, white blood cells, epithelial cells and/or antimicrobial agents.

50 [0037] As used herein, the term "saliva-soluble" is intended to refer to compounds, ingredients, or any other substances which can dissolve in saliva present in the oral cavity of the user at physiological temperature. Such substances may include, for example, nicotine and/or flavours. In some cases a standard commercially available artificial saliva may be used to test saliva solubility. Alternatively, "saliva-soluble" may equate to "water-soluble" and refer to compounds, ingredients, or any other substances which can dissolve in water present in the oral cavity of the user at physiological temperature.

55 [0038] As used herein, the term "plant material" is intended to refer to a portion and/or part(s) of a plant (e.g. leaf, stem, flower or bud). The plant material may be processed (for example, by shredding, grinding or drying) or it may be non-processed (that is, used whole). The plant material is typically fibrous (comprising or characterised by fibres). For the avoidance of doubt, the term "plant material" is not intended to include pulp and/or paper which is derived from a plant material (typically wood) and chemically and/or mechanically processed to extract fibres before use.

[0039] As used herein, the term "moisture content" may include water, humectants, liquid flavourants and/or other liquid compounds.

[0040] As used herein, the term "oral consumption" is intended to refer to any oral administration route achieved by

placing the smokeless article into the oral cavity. This includes, but is not limited to, buccal, sub-lingual, periodontal, gingival and ingestion.

[0041] The smokeless article may be described as a snus article.

[0042] The smokeless article comprises a pouch having a contents, wherein the contents (e.g. nicotine-dosed non-tobacco plant material fibres) is completely enclosed by the pouch. The pouch is sealed to ensure that the contents of the pouch does not scatter inside the mouth.

[0043] The smokeless article preferably has a mass of about 0.1 g to 5.0 g, such as about 0.5 g to about 4.0 g or about 1.0 g to about 3.0 g.

[0044] The smokeless article preferably has a length of about 30 mm, such as about 28 mm or 26 mm, a width of about 12 mm, such as about 10 mm or 8 mm, and a depth of about 5 mm, such as about 4 mm or 3 mm.

[0045] The smokeless article preferably has an active lifetime of about 20 minutes to about 60 minutes, such as about 25 minutes to 50 minutes or about 30 minutes to about 45 minutes, after being placed in the mouth. As used herein, the term "active lifetime" is intended to refer to the amount of time after being placed in the mouth that the smokeless article provides the user with a perceptible taste and/or physiological experience. For example, for an article containing an active ingredient such as nicotine or other pharmacologically active ingredient the active lifetime may be defined as the in use period of time in which 90%wt of the available pharmacologically active is released. In other words, the active lifetime may be the duration of time from insertion into the oral cavity for 90%wt of the total amount of nicotine pharmacologically active ingredient that is capable of being released during normal use to dissolve into the user's saliva and /or enter the user's bloodstream. It will therefore be appreciated that the active lifetime of a product may vary from user to user and for a user based on oral conditions, in particular extent of salivation. Nonetheless, the skilled person is able to mimic oral conditions to determine the active lifetime in one instance, which can be used as a comparison or analysis point.

[0046] The pouch may be formed from one or more materials. The pouch material may be formed from fiber, paper, cloth and fabric. The pouch material may be formed from one or more polymeric materials. The polymeric material may be selected from one or more of hydroxypropyl cellulose (HPC), hydroxypropyl methylcellulose (HPMC), polyvinyl alcohol (PVOH), polyvinylpyrrolidone (PVP), polyethylene oxide (PEO) hydroxyethyl cellulose (HEC), polyethylene glycol (PEG), pullulan, sodium alginate, xanthan gum, tragacanth gum, guar gum, acacia gum, arabic gum, polyacrylic acid, maltodextrin, methylmethacrylate copolymer, carboxyvinyl copolymers, starch and gelatin.

[0047] The pouch is typically completely insoluble in saliva. Suitable insoluble pouch materials include, but are not limited to, fiber, paper, water-insoluble polymers, cloth and fabric. Suitable soluble pouch materials include, but are not limited to, water-soluble polymers such as polyethylene oxide (PEO), hydroxypropyl cellulose (HPC) and hydroxypropyl methylcellulose (HPMC).

[0048] The pouch may be formed by, for example, folding a single sheet on itself or bringing two or more sheets together and sealing the edges. The edges may initially be partially sealed to provide an open pouch in which the content (e.g. nicotine-dosed non-tobacco plant material fibres) may be placed before completely sealing the pouch closed. The sheets may be the same thickness or different thicknesses.

[0049] The pouch is porous. Preferably, at least 50% of the pores have a diameter of 50 μm to 200 μm , such as 100 μm to 175 μm or 125 μm or 150 μm . at least 50% of the pores have a diameter of at least 100 μm . For example, at least 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95% or 100% of the pores have such diameters.

[0050] The pouch may be coloured or include markings, such as brand logos and text, to improve user perception. The pouch may be partially or completely coloured by a colourant.

[0051] The contents comprise nicotine-dosed non-tobacco plant material fibres and a flavourant, and may comprise one or more additional substances. The or each additional substance may be enclosed within a pouch.

[0052] The or each additional substance may individually be a biologically/pharmacologically active compound, pH stabilisers or adjusters, humectants, flavourants, fillers, preservatives, aqueous/non-aqueous solvents and binders. The or each additional substance may be provided for more than one purpose.

[0053] The contents of the pouch (i.e. the ingredients, material and/or substances enclosed within the pouch) preferably occupies substantially all of the internal volume of the pouch. The contents may occupy 80%, 85%, 90%, 95% or 100% of the internal volume of the pouch. The contents may comprise a solid material to provide physical integrity, such as an organic material (e.g. plant material) or an inorganic material. Such solid materials may naturally or inherently contain one or more biologically/pharmacologically active compounds and/or additives.

[0054] **Biologically/pharmacologically active compounds** are provided to produce a pharmacological effect in the user. Suitable biologically/pharmacologically active compounds include the group consisting of: nicotine, cocaine, caffeine, opiates and opioids, cathine and cathinone, kavalactones, mysticin, beta-carboline alkaloids, salvinorin A together with any combinations, functional equivalents to, and/or synthetic alternatives of the foregoing. Biologically/pharmacologically active compounds may also have additive properties.

[0055] In some embodiments the contents include an active compound comprising nicotine and wherein the form of nicotine is selected from the group consisting of nicotine salts, nicotine base, stabilized nicotine and mixtures thereof.

For example, the [contents]/[smokeless article] may include at least one nicotine salt selected from the group consisting of nicotine hydrochloride, nicotine dihydrochloride, nicotine monotartrate, nicotine bitartrate, nicotine bitartrate dihydrate, nicotine sulfate, nicotine zinc chloride monohydrate, nicotine salicylate and mixtures thereof.

[0056] pH stabilisers or adjusters may be provided to adjust the user experience and/or modify the bioavailability of a pharmacologically active compound. For instance, under acidic conditions, nicotine is protonated and does not readily cross mucous membranes. Examples of suitable pH stabilisers include ammonia, ammonium carbonate, sodium carbonate and calcium carbonate. The overall pH of the smokeless article is preferably pH 7 to pH 9, such as pH 7.25 to pH 8.75 or pH 7.5 to pH 8.5.

[0057] The overall pH of a smokeless article may be determined by, for example, (i) placing the smokeless article in 10 mL of distilled water (ii) agitating the mixture for at least 5 minutes and (iii) measuring the pH of the solution with a pH probe.

[0058] Fillers may be provided to increase the volume of the smokeless article (e.g. by increasing the volume contained within the pouch and to strengthen the contents). Suitable fillers include calcium carbonate, calcium phosphate, corn starch, grains, lactose, polysaccharides (e.g. maltodextrin), polyols, sugars (e.g. dextrose, mannitol, xylitol, sorbitol), natural fibres (e.g. non-tobacco fibres), microcrystalline cellulose, cellulose and cellulose derivatives (e.g. finely divided cellulose), lignocellulose fibres (e.g. wood fibres), jute fibres and combinations thereof. In some cases, the filler content is 5 to 10 wt% of the contents e.g. around 6 to 9 wt%.

[0059] Flavourants may be provided in solid or liquid form. Suitable flavourants include coffee, eucalyptus, menthol, liquorice, peppermint, spearmint, chocolate, fruit flavour (including e.g. citrus, cherry etc.), vanilla, spice (e.g. ginger, cinnamon) and tobacco flavour. The flavourant may be evenly dispersed throughout the contents or may be provided in isolated locations and/or varying concentrations throughout the contents. As used herein, the term "flavourant" denotes a compound having a desirable taste, aroma or both.

[0060] Humectants may be provided to control moisture content thereby preventing the smokeless article from drying out during storage and reducing the amount of saliva wetting required before the user experience begins. Suitable humectants include polyhydric alcohols (e.g. propylene glycol (PG), triethylene glycol, 1,2-butane diol and vegetable glycerine (VG)) and their esters (e.g. glycerol mono-, di- or tri-acetate).

[0061] The humectant may have a lower limit of at least 1 % by weight of the contents such as at least 2 wt%, such as at least 5 wt%, such as at least 10 wt%, such as at least 20 wt%, such as at least 30 wt%, or such as at least 40 wt%.

[0062] The humectant may have an upper limit of at most 50% by weight of the contents, such as at most 40 wt%, such as at most 30 wt%, or such as at most 20 wt%, such as at most 10 wt %, such as at most 5 wt %, such as at most 2 wt%..

[0063] Preferably, the amount of humectant is 1 to 40 wt% of the contents, such as 2 to 20 wt% or 5 to 10 wt%.

[0064] Preferably, the contents has an overall amount of water of between 5 and 50 wt% based on the weight of the contents such as between 10 to 20 wt% or 40 to 50 wt%.

[0065] Smokeless articles having a total moisture content of 10% or less are generally considered to be 'dry'. Smokeless articles having a total moisture content of 40% or more are generally considered to be 'wet'.

[0066] Sweeteners may be provided to modify the user taste perception and, in particular, overcome bitter flavours that result from other substances. Suitable sweeteners include honey, sugar, brown sugar, glucose, fructose, sucrose, aspartame, xylitol, maltitol, saccharin sodium, glycyrrhizin tripotassium liquorice, jujube or a mixture thereof. The amount of sweetener is in some cases 1 to 20 % by weight of the contents, such as 2 to 15 wt% or 5 to 10 wt%.

[0067] Stabilisers are provided to prevent decomposition or degradation over time during storage by, for example, retarding oxidation or unwanted biological activity. Stabilisers may be selected from the group consisting of antioxidants including vitamin E, such as tocopherole, ascorbic acid, sodium pyrosulfite, butylhydroxytoluene, butylated hydroxyanisole, edetic acid and salts thereof; and preservatives including citric acid, tartaric acid, lactic acid, malic acid, acetic acid, benzoic acid, sorbic acid and salts thereof.

[0068] Binders may be provided. Suitable binders include starches and/or cellulosic binders such as methyl cellulose, ethyl cellulose, hydroxypropyl cellulose, hydroxyethyl cellulose and carboxymethyl cellulose, gums such as xanthan, guar, arabic and/or locust bean gum, organic acids and their salts such as alginic acid (sodium alginate), agar and pectins. In some embodiments the binder content is 5 to 10 wt% of the contents e.g. around 6 to 9 wt% or 7 to 8 wt%.

[0069] Colourants may be provided to modify the user impression of the smokeless article. Colourants include whitening agents. Colourants may be selected from one or more of common colourants such as curcumin (E100), turmeric (E100(ii)), riboflavin (E101), riboflavin-5'-phosphate (E101(ii)), tartrazine (E102), quinoline yellow (E104), riboflavin-5-sodium phosphate (E106), yellow 2G (E107), sunset yellow FCF (E110), carmine, cochineal (E120), azorubine (E122), amaranth (E123), ponceau 4R (E124), erythrosine (E127), red 2G (E128), allura red AC (E129), patent blue V (E131), indigotine (E132), brilliant blue FCF (E133), chlorophylls (E140), copper complexes of chlorophyll (E141), green S (E142), caramel (E150a-d), brilliant black BN (E151), carbon (E153), brown FK (E154), brown HT (E155), alfa-, beta- and gamma-carotene (E160a), annatto, bixin, norbixin (E160b), bell pepper (Paprika) extract (E160c), lycopene (E160d), beta-apo-8'-carotenal (E160e), ethyl ester of beta-apo-8'-carotenic acid (E160f), flavoxanthin (E161a), lutein (E161b), cryptoxanthin (E161c), rubixanthin (E161d), violaxanthin (E161e), rhodoxanthin (E161f), canthaxanthin (E161g), citranaxanthin

(E161h), beetroot extract (E162), anthocyanins (E163), calcium carbonate (E170), titanium dioxide (E171), iron oxides (E172), aluminium (E173), silver (E174), gold (E175), lithol rubine BK (E180), tannins (E181). The amount of colourant may be up to about 3% by weight of the smokeless article, such as about 0.5% to about 2.5% or about 1% to about 2%.

[0070] Plant material may be provided for physical integrity and may function as a natural source of substances such as, for example, biologically/pharmacologically active compounds, flavourants, pH stabilisers etc. The plant material may comprise least one plant material selected from the list including *Amaranthus dubius*, *Arctostaphylos uva-ursi* (Bearberry), *Argemone mexicana*, *Amica*, *Artemisia vulgaris*, Yellow Tees, *Galea zacatechichi*, *Canavalia maritima* (Baybean), *Cecropia mexicana* (Guamura), *Cestrum nocturnum*, *Cynoglossum virginianum* (wild comfrey), *Cytisus scoparius*, *Damiana*, *Entada rheedii*, *Eschscholzia californica* (California Poppy), *Fittonia albivenis*, *Hippobroma longiflora*, *Humulus japonica* (Japanese Hops), *Humulus lupulus* (Hops), *Lactuca virosa* (Lettuce Opium), *Laggera alata*, *Leonotis leonurus*, *Leonurus cardiaca* (Motherwort), *Leonurus sibiricus* (Honeyweed), *Lobelia cardinalis*, *Lobelia inflata* (Indian-tobacco), *Lobelia siphilitica*, *Nepeta cataria* (Catnip), *Nicotiana species* (Tobacco), *Nymphaea alba* (White Lily), *Nymphaea caerulea* (Blue Lily), Opium poppy, *Passiflora incarnata* (Passionflower), *Pedicularis densiflora* (Indian Warrior), *Pedicularis groenlandica* (Elephant's Head), *Salvia divinorum*, *Salvia dorrii* (Tobacco Sage), *Salvia species* (Sage), *Scutellaria galericulata*, *Scutellaria lateriflora*, *Scutellaria nana*, *Scutellaria species* (Skullcap), *Sida acuta* (Wireweed), *Sida rhombifolia*, *Silene capensis*, *Syzygium aromaticum* (Clove), *Tagetes lucida* (Mexican Tarragon), *Tarhonanthus camphoratus*, *Tumera diffusa* (Damiana), *Verbascum* (Mullein), *Zamia latifolia* (Maconha Brava) together with any combinations, functional equivalents to, and/or synthetic alternatives of the foregoing.

[0071] The plant material may be tobacco. Any type of tobacco may be used. This includes, but is not limited to, flue-cured tobacco, burley tobacco, Maryland Tobacco, dark-air cured tobacco, oriental tobacco, dark-fired tobacco, perique tobacco and rustica tobacco. This also includes blends of the above mentioned tobaccos.

[0072] Any suitable parts of the tobacco plant may be used. This includes leaves, stems, roots, bark, seeds and flowers.

[0073] The tobacco may comprise one or more of leaf tobacco, stem tobacco, tobacco powder, tobacco dust, tobacco derivatives, expanded tobacco, homogenised tobacco, shredded tobacco, extruded tobacco, cut rag tobacco and/or reconstituted tobacco (e.g. slurry recon or paper recon).

[0074] The contents may comprise at least 50 wt% plant material based on the weight of the contents, e.g. at least 60 wt% plant material e.g. around 65 wt% plant material. The contents may comprise 80 wt% or less plant material e.g. 75 or 70 wt% or less plant material.

[0075] The contents may comprise a gathered sheet of homogenised (e.g. paper/slurry recon) tobacco or gathered shreds/strips formed from such a sheet.

[0076] The sheet may have a grammage greater than or equal to 100 g/m², e.g. greater than or equal to 110 g/m² such as greater than or equal to 120 g/m². The sheet may have a grammage of less than or equal to 300 g/m² e.g. less than or equal to 250 g/m² or less than or equal to 200 g/m². The sheet may have a grammage of between 120 and 190 g/m².

[0077] The skilled person will appreciate that except where mutually exclusive, a feature or parameter described in relation to any one of the above aspects may be applied to any other aspect. Furthermore, except where mutually exclusive, any feature or parameter described herein may be applied to any aspect and/or combined with any other feature or parameter described herein.

Summary of the Figures

[0078] So that the invention may be understood, and so that further aspects and features thereof may be appreciated, embodiments illustrating the principles of the invention will now be discussed in further detail with reference to the accompanying figures, in which:

Figure 1 shows a cross sectional view of a first embodiment of a smokeless article.

Figure 2 shows a cross sectional view of a second embodiment of a smokeless article.

Figure 3 shows a cross sectional view of a third embodiment of a smokeless article.

Figure 4 shows a cross sectional view of a fourth embodiment of a smokeless article.

Figure 5 shows the whiteness chart used to quantitatively assess the whiteness of products in the examples below.

Figure 6 shows photographs of various products according to the invention as well as comparative products. The products are: A1: 200 μm wheat fibres with mint flavourant; A2: 200 μm wheat fibres with blackcurrant flavourant; A3: 200 μm wheat fibres with rhubarb flavourant; B1: 30 μm wheat fibres with mint flavourant; B2: 30 μm wheat fibres with blackcurrant flavourant; B3: 30 μm wheat fibres with rhubarb flavourant; C1: 30 μm bamboo fibres with

mint flavourant; C2: 30 µm bamboo fibres with blackcurrant flavourant; C3: 30 µm bamboo fibres with rhubarb flavourant; D1: 300 µm bamboo fibres with mint flavourant; D2: 300 µm bamboo fibres with blackcurrant flavourant; D3: 300 µm bamboo fibres with rhubarb flavourant.

5 **Detailed Description of the Figures**

[0079] As shown in Figure 1 there is provided a first embodiment of a smokeless article 10 having a pouch 12 containing contents 14. The pouch 12 is substantially rectangular. The pouch 12 is formed from a single sheet of material and is substantially filled by the contents 14. The pouch 12 has a seal 16 along each of the three edges where the inner face of the single sheet meets itself to seal the contents 14 in the pouch 12.

10 [0080] Figure 2 shows a second embodiment of a smokeless article 10' having a pouch 12 containing contents 14. The pouch 12 is substantially circular. The pouch 12 is formed from two opposing sheets of material and is substantially filled by the contents 14. The pouch has a circumferential seal 16 along the edges where the two opposing sheets of material meet to seal the contents 14 in the pouch 12.

15 [0081] Figure 3 shows a third embodiment of a smokeless article 10" that, like the first embodiment, has a pouch 12 made from a single sheet of material. However, one of the three seals 16' is formed by an overlap of the inner face and the outer face of the single sheet meet to seal the contents 14 in the pouch 12. The remaining two seals at opposing ends of the pouch 12 are formed where the inner face of the single sheet meets itself.

20 [0082] Figure 4 shows a fourth embodiment of a smokeless article 10"" that comprises the third embodiment enclosed by outer pouch 12" having an outer contents 14" positioned in the space between the inner pouch 12' and the outer pouch 12". The outer pouch 12" also has a circumferential seal 16"" to seal the outer contents 14" and inner pouch 12' in the outer pouch 12".

25 [0083] Use of the fourth embodiment begins when the smokeless article 10"" is placed in the user's mouth where it is exposed to saliva. Saliva first permeates outer pouch 12" and dissolves and extracts the saliva soluble substances of outer contents 14". Upon leaving the outer pouch 12", the saliva soluble substances of outer contents 14" therefore provide the user with a first experience. Saliva subsequently further permeates the inner pouch 12' where it dissolves and extracts the saliva soluble substances of inner contents 14'. The saliva soluble substances of inner contents 14' therefore provide the user with a complimentary and secondary experience. When the extractable amount of saliva soluble substances in the inner contents 14' and outer contents 14" drops below perceivable levels the active lifetime of the smokeless article 10"" has ended.

Examples

35 [0084] Various snus samples were prepared and assessed for discoloration. The whiteness chart provided in Figure 5 was used to assign a numerical value for whiteness to a given product.

[0085] Twelve different samples were prepared which contained either bamboo or wheat fibres with different particle sizes (30 µm, 200 µm or 300 µm) mixed with three different flavourants. JELUCEL® wheat and bamboo fibres were obtained from Jelu-werk (WF-30, WF-200, BF-30 and BF-300).

[0086] For each sample a 100 g master batch was prepared containing ingredients according to the following table:

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Ingredient	Content / g
Nicotine ditartrate dihydrate	1.40
Plant material fibres	56.02
Salt	4.20
Water	30.00
Ammonium chloride solution	2.03
Propylene glycol	3.65
Sodium carbonate solution	0.41
Flavour	2.30
Total	100

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[0087] Twelve master batches were prepared by varying the particular plant material fibres and flavourant used.

[0088] The master batches were prepared by mixing the ingredients together on the laboratory scale with high-shear

mixing apparatus. Product was then manually filled into pouches and sealed using an industry standard heat sealer.

[0089] The twelve samples were assessed visually with reference to the whiteness chart shown in Figure 5. Photographs of the twelve samples are shown in Figure 6.

[0090] The twelve samples and the visually determined whiteness value were as follows (the samples can be identified from Figure 6 by reading off the column and row identifiers from the Figure, e.g. the bottom right cell is sample D3):

<i>Sample</i>	<i>Nicotine-dosed non-tobacco plant material</i>	<i>Average fibre length (μm)</i>	<i>Flavourant</i>	<i>Whiteness value</i>
A1	Wheat (WF-200)	200	Mint	14
A2	Wheat (WF-200)	200	Blackcurrant	20
A3	Wheat (WF-200)	200	Rhubarb	16
B1	Wheat (WF-30)	30	Mint	3
B2	Wheat (WF-30)	30	Blackcurrant	8
B3	Wheat (WF-30)	30	Rhubarb	9
C1	Bamboo (BF-30)	30	Mint	8
C2	Bamboo (BF-30)	30	Blackcurrant	10
C3	Bamboo (BF-30)	30	Rhubarb	9
D1	Bamboo (BF-300)	300	Mint	12
D2	Bamboo (BF-300)	300	Blackcurrant	15
D3	Bamboo (BF-300)	300	Rhubarb	11

[0091] For a given type of flavourant, the four samples using different nicotine-dosed non-tobacco plant material can be compared for whiteness and discoloration.

[0092] Within column 1 of Figure 6 (mint flavour), the 30 μm wheat fibres underwent very little discoloration, with the sample remaining essentially white. The 30 μm bamboo fibres underwent some discoloration but were still acceptably white in appearance. By contrast both the 200 μm wheat fibres and 300 μm bamboo fibres were significantly discoloured in appearance.

[0093] The blackcurrant flavour (column 2 of Figure 6) caused significant discoloration of both the 200 μm wheat fibres and 300 μm bamboo fibres, with the 200 μm wheat fibres developing a brown colour. The 30 μm wheat fibres and 30 μm bamboo fibres remained acceptably white in colour.

[0094] The rhubarb flavour (column 3 of Figure 6) caused noticeable yellowing of both the 200 μm wheat fibres and 300 μm bamboo fibres. By contrast the 30 μm wheat fibres and 30 μm bamboo fibres retained a whiter appearance.

[0095] Overall the 30 μm wheat fibres provided very good results in retaining an acceptably white appearance of the sample across all flavourants tested.

[0096] The features disclosed in the foregoing description, or in the following claims, or in the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for obtaining the disclosed results, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

[0097] While the invention has been described in conjunction with the exemplary embodiments described above, many equivalent modifications and variations will be apparent to those skilled in the art when given this disclosure. Accordingly, the exemplary embodiments of the invention set forth above are considered to be illustrative and not limiting. Various changes to the described embodiments may be made without departing from the scope of the invention.

[0098] For the avoidance of any doubt, any theoretical explanations provided herein are provided for the purposes of improving the understanding of a reader. The inventors do not wish to be bound by any of these theoretical explanations.

[0099] Any section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described.

[0100] Throughout this specification, including the claims which follow, unless the context requires otherwise, the words "have", "comprise", and "include", and variations such as "having", "comprises", "comprising", and "including" will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

[0101] It must be noted that, as used in the specification and the appended claims, the singular forms "a," "an," and

"the" include plural referents unless the context clearly dictates otherwise. Ranges may be expressed herein as from "about" one particular value, and/or to "about" another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by the use of the antecedent "about," it will be understood that the particular value forms another embodiment. The term "about" in relation to a numerical value is optional and means, for example, +/- 10%.

[0102] The words "preferred" and "preferably" are used herein refer to embodiments of the invention that may provide certain benefits under some circumstances. It is to be appreciated, however, that other embodiments may also be preferred under the same or different circumstances. The recitation of one or more preferred embodiments therefore does not mean or imply that other embodiments are not useful, and is not intended to exclude other embodiments from the scope of the disclosure, or from the scope of the claims.

Claims

1. A smokeless article for oral consumption comprising a pouch enclosing a content, the content comprising nicotine-dosed non-tobacco plant material fibres and a flavourant; wherein the plant material fibres have a particle size of up to 30 μm .
2. A smokeless article according to claim 1, wherein the nicotine-dosed non-tobacco plant material fibres have a particle size of from 5 to 30 μm .
3. A smokeless article according to claim 1 or 2, wherein the nicotine-dosed non-tobacco plant material fibres comprise or consist of one or more of nicotine-dosed wheat fibres and nicotine-dosed bamboo fibres.
4. A smokeless article according to claim 3, wherein the nicotine-dosed non-tobacco plant material fibres comprise or consist of wheat fibres.
5. A smokeless article according to any one of claims 1 to 4, wherein the flavourant is a flavourant which causes discoloration of nicotine-dosed non-tobacco plant material fibres when nicotine-dosed non-tobacco plant material fibres having a particle size of around 300 μm are contacted with the flavourant.
6. A smokeless article according to any one of claims 1 to 5, wherein the flavourant comprises or consists of one or more of a fruit flavourant and a vegetable flavourant.
7. A smokeless article according to any one of claims 1 to 6, wherein the flavourant is selected from a flavourant comprising mint extract, blackcurrant extract or rhubarb extract.
8. A smokeless article according to any one of claims 1 to 7, wherein the nicotine-dosed non-tobacco plant material fibres comprise a nicotinic compound selected from nicotine, nicotine salt(s), nicotine complex(es); and nicotine solvate(s).
9. A smokeless article according to any one of claims 1 to 8, wherein the smokeless article is tobacco-free.
10. A smokeless article according to any one of claims 1 to 9, wherein the total nicotine content is from 5 to 15 mg, preferably about 10 mg.
11. A method of improving the whiteness of a content of a smokeless article, wherein the smokeless article is for oral consumption and comprises a pouch enclosing the content, the method comprising the provision of nicotine-dosed non-tobacco plant material fibres and a flavourant within the content; wherein the plant material fibres have a particle size of up to 30 μm .
12. Use of plant material fibres have a particle size of up to 30 μm as a whitening agent in a smokeless article.
13. The use according to claim 12 wherein the smokeless article is according to any one of claims 1 to 10.
14. A method of manufacturing a smokeless article according to any one of claims 1 to 10 comprising the steps of;
 - (i) forming one or more sheets of pouch material around the contents; and

(ii) thermally or chemically sealing the pouch material to enclose the contents.

15. A kit comprising a plurality of smokeless articles according to any one of claims 1 to 10 and a container.

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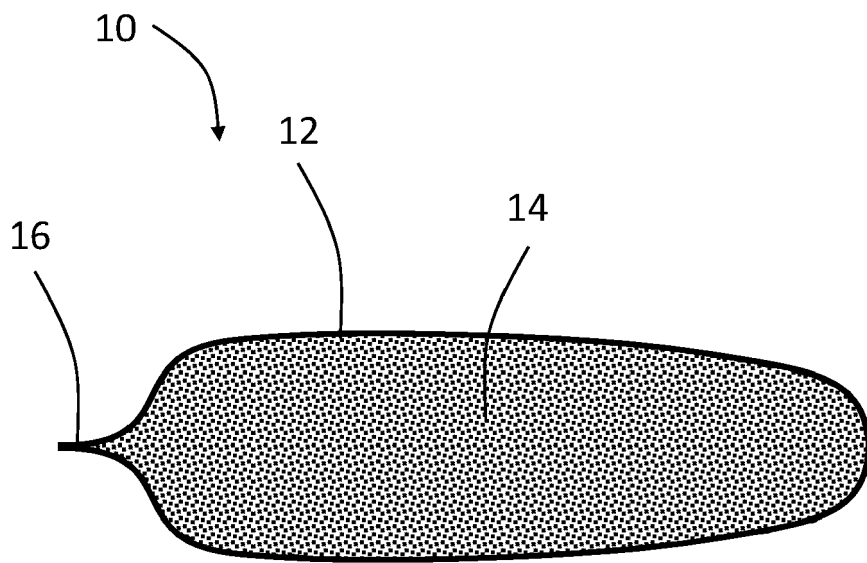


Figure 1

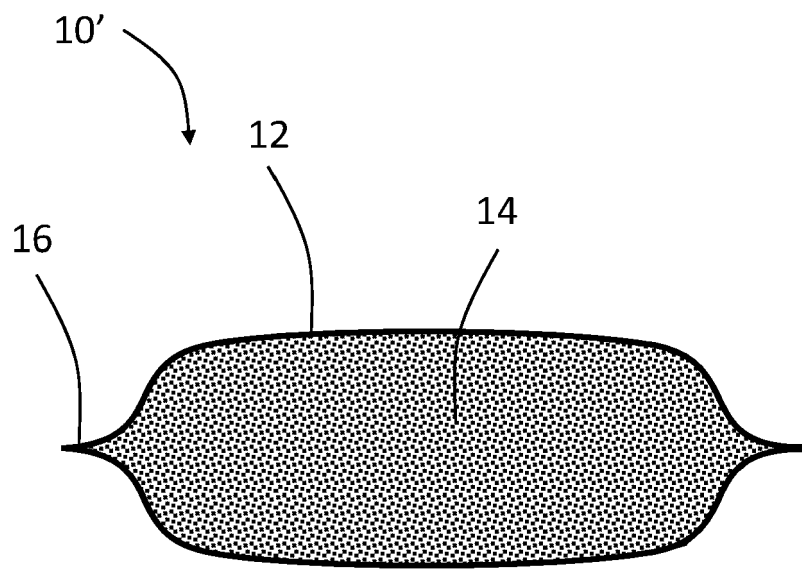


Figure 2

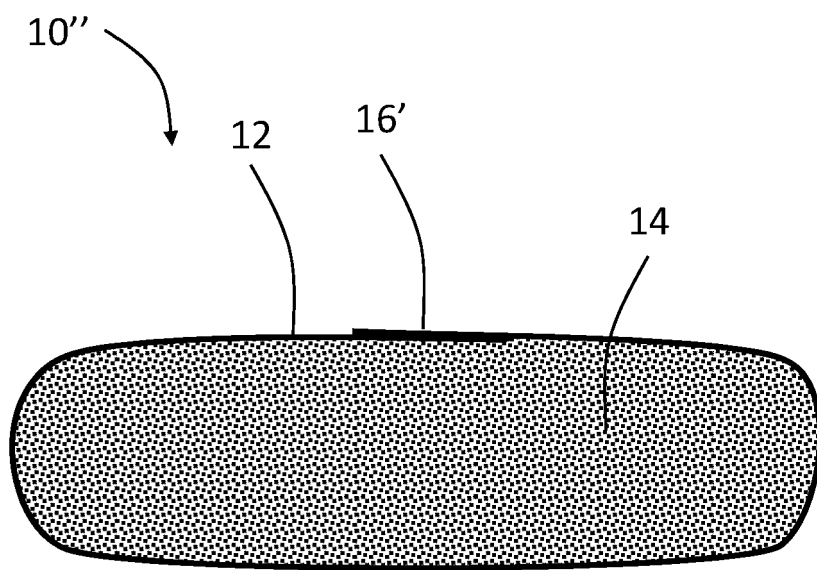


Figure 3

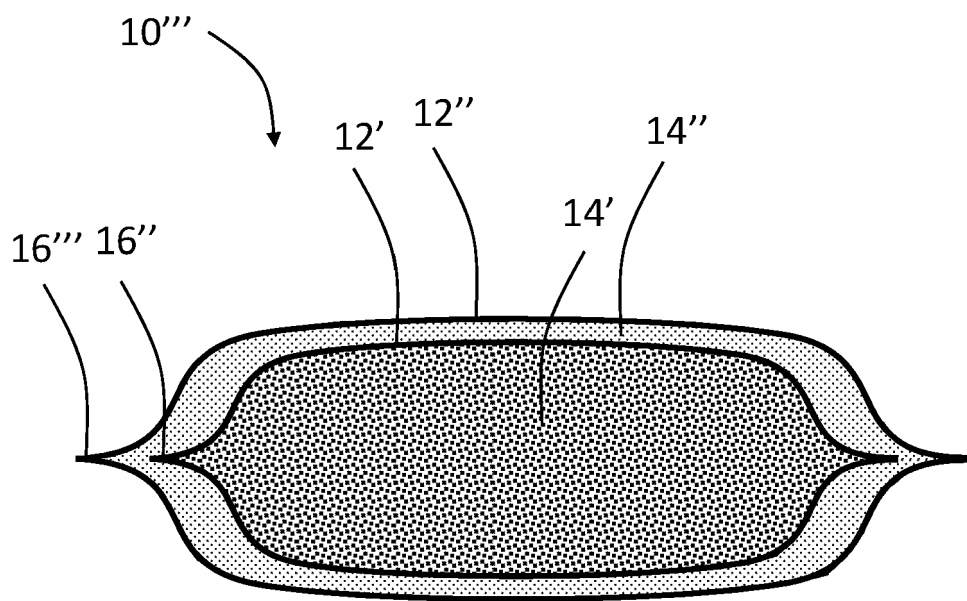


Figure 4

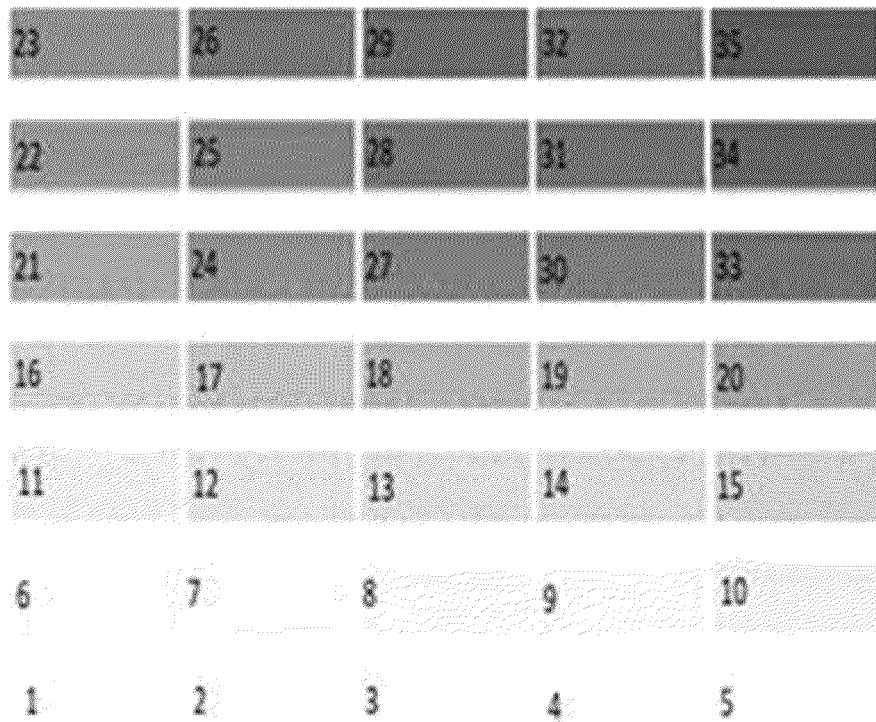


Figure 5

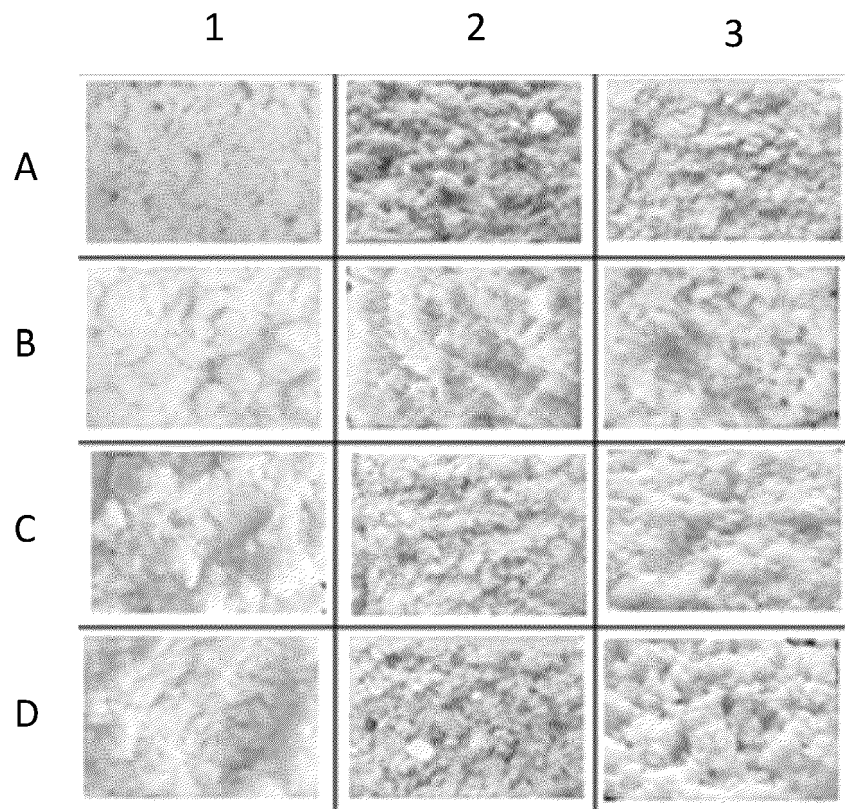


Figure 6



EUROPEAN SEARCH REPORT

Application Number
EP 20 15 8084

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A	* paragraphs [0013], [0017], [0019], [0025], [0026], [0030]; claims 1, 13,19 *	2	
X	----- EP 3 491 940 A1 (REEMTSMA CIGARETTENFABRIKEN GMBH [DE]) 5 June 2019 (2019-06-05) * examples; paragraphs [0010], [0012]; claim 5; figure 1 *	4	
A	----- US 2013/108741 A1 (SENGUPTA TAPASHI [US] ET AL) 2 May 2013 (2013-05-02) * claims 16,18,20, 32,33 *	1-15	
A	----- WO 2013/152918 A1 (SWEDISH MATCH NORTH EUROPE AB [SE]) 17 October 2013 (2013-10-17) * examples; paragraph [0030]; claim 23 *	1-15	TECHNICAL FIELDS SEARCHED (IPC)
			A24B
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Place of search The Hague		Date of completion of the search 24 August 2020	Examiner Villányi Kelemen, K
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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