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(54) **TOBACCO SUBSTITUTE, USE AND METHOD FOR THE PRODUCTION THEREOF**

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(57) **ABSTRACT**

A tobacco substitute, in particular for use in a waterpipe (shisha), tobacco pipe or electronic cigarette, including a liquid fluid and a carrier material for the fluid is disclosed. To provide a tobacco substitute which forms a denser vapor or denser aerosol in comparison with known tobacco substitute systems, the carrier material of the tobacco substitute includes apatite.

TOBACCO SUBSTITUTE, USE AND METHOD FOR THE PRODUCTION THEREOF

BACKGROUND OF THE INVENTION

[0001] The present invention concerns a tobacco substitute, the use thereof and a method for the production thereof.

[0002] Besides the "genuine" tobacco usually employed in tobacco goods of all kinds alternative tobacco systems have also been known for some time, by means of which flavoring substances and/or active substances can be consumed in the form of aerosols, that is to say smoke or vapor. These also include inter alia nicotine-free herbs but also further in particular mineral carrier materials like for example vapor stones which are coated with aromatized fluid, for example flavor syrup or so-called molasses or treacle. Those carrier materials can be portioned and are suitable for putting the aromatized fluid into an inhalable administration form. Such carrier materials are used inter alia in waterpipes (shishas), conventional tobacco pipes and electronic cigarettes, so-called e-cigarettes.

[0003] If those tobacco substitute systems are heated to a temperature at which neither the carrier material nor the aromatized fluid burns then no smoke is produced in that case, as in relation to genuine tobacco, but a vapor or aerosol, that is to say finely distributed liquid droplets. Such systems have the advantage that generally they contain no nicotine and no tar so that they are considered to be less harmful to health than tobacco.

[0004] Different tobacco substitute systems are known. WO 2011/120518 discloses as the carrier material a stone which has pores and which contains at least 65% of clinoptilolite and is charged with a fluid which forms an aerosol in the waterpipe.

[0005] DE 10 2007 033 083 discloses a tobacco substitute which as carrier materials has inter alia fiber materials, foams and loose materials like montmorillonite, dolomite or kieselguhr.

[0006] It has been found that with many of those systems a smoke or vapor which is already optically clearly thinner than in the case of genuine tobacco is produced, whereby a markedly different smoking sensation is produced in comparison with the classic consumption of genuine tobacco.

DESCRIPTION OF THE INVENTION

[0007] With that background in mind there was a need for a tobacco substitute system which in comparison with known systems forms a denser vapor or denser aerosol.

[0008] That object is attained by a tobacco substitute, in particular for use in a waterpipe (shisha), tobacco pipe or electronic cigarette, which includes a liquid fluid and a carrier material for the fluid, characterised in that the carrier material includes apatite.

[0009] It has been found that with such a system a considerable amount of a fluid can be adsorbed or absorbed. It is assumed that on that basis a smoking experience comparable to the classic consumption of tobacco can be afforded over a longer period of time. In addition it has been found that apatite is suitable for accommodating the most widely varying fluids.

[0010] A further advantage of using apatite as the carrier material or a constituent of the carrier material is that it remains unchanged under temperatures in the region of between 100 and 350° C., that are usually employed in smoking uses, and thus does not transfer into the aerosol or the vapor formed. For that reason there is also the possibility of charging apatite as the carrier material with fluid again after a use so that the carrier material is re-usable.

[0011] The term "fluid" or "liquid fluid" or "substantially liquid fluid" denotes in accordance with this invention fluids which at room temperature (18° C.) and normal pressure (1.01325 bar) are in a fluid physical state.

[0012] In certain embodiments the fluid includes water, one or more polyols, one or more sugars, one or more coloring agents, one or more flavor substances and/or active substances. Examples of polyols which are suitable according to the invention include but are not limited to glycerin, propylene glycol and mixtures thereof. In certain embodiments glucose can be used as the sugar. In a preferred embodiment the fluid includes one or more active substances and/or flavor substances. Such active substances and flavor substances include extracted and/or synthetic plant substances, including those from fruits, herbs, fruit products as well as plant products and mixtures thereof, for example also caffeine and nicotine. Active substances and flavor substances can be present for example in the form of esters, ethers, oils, monovalent alcohols or mixtures thereof.

[0013] Fluids which are suitable and can be used according to the invention are also commercially available for use with vapor stones and are also referred to as flavor syrups, molasses or treacle.

[0014] The term "aerosol" as is used here relates to solid and/or liquid particles which are very finely distributed in a gas. If exclusively liquid particles are involved the aerosol is also referred as vapor. If substantially solid particles are involved the aerosol is also referred as smoke.

[0015] The term "apatite" as is used here denotes calcium phosphates like hydroxylapatite ($Ca_5(PO_4)_3OH$), fluoroapatite ($Ca_5(PO_4)_3F$), chloroapatite ($Ca_5(PO_4)_3Cl$), carbonate-bearing apatites and further naturally occurring and/or synthetically produced apatites. In a particularly preferred embodiment of the invention the apatite is hydroxylapatite.

[0016] In an embodiment the carrier material has an apatite proportion of between 70% by weight and 100% by weight, preferably between 80% by weight and 100% by weight, particularly preferably between 90% by weight and 100% by weight, with respect to the total weight of the uncharged carrier material. In an embodiment the carrier material consists of apatite. It has been found that apatite can be used substantially as the exclusive carrier material and is inert in respect of taste and in regard to the production of the aerosol.

[0017] The carrier material optionally has additives. Such additives include but are not limited to stearates, in particular magnesium stearate, polyethylene glycols, polyethylene oxides and talcum. The additives can advantageously be used as tabletting additives.

[0018] In a further embodiment the apatite has a specific surface area of more than 60 m^2/g, preferably more than 70 m^2/g, measured using the BET method in accordance with DIN-ISO 9277 2003-05. In an embodiment the apatite has a specific surface area of up to 250 m^2/g.

[0019] Preferably the proportion of fluid to the carrier material is between 2% by weight and 55% by weight, particularly preferably between 5% by weight and 30% by weight, with respect to the total weight of the carrier

material with fluid. It has been found that with that ratio by weight a particularly good and long-lasting aerosol production is achieved.

[0020] Preferably the carrier material is in the form of a pressed tablet. In this case the term "tablet" refers to a pressed shaped item which is produced under pressure in tablet presses which are known to the man skilled in the art for that purpose or other press assemblies. The pressing pressure which is preferably used for the production of such tablets is advantageously in the region of between 60 MPa and 300 MPa with an optional pre-pressing pressure of between 20 MPa and 100 MPa.

[0021] Desirably the table is of a cylindrical or biconvex shape with a diameter in the range of between 2 mm and 2 cm. In this case the term "biconvex shape" refers generally to a shape which is substantially round in a view from below or above and which is curved upwardly and downwardly. A substantially round shape can include a circular shape but also slight deviations therefrom including regular polygons (triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons, etc) as well as oval shapes. The same applies to a tablet of cylindrical shape, the base and top surfaces of which are of a substantially round shape as described above.

[0022] In alternative embodiments the tobacco substitute is in a form obtained by extrusion, compacting, 3D printing or injection molding. These methods provide a greater variability in shape.

[0023] In a preferred embodiment the fluid has a water content in the region of between 0% by weight and 50% by weight, with respect to the total volume of the fluid, preferably between 0.5% by weight and 10% by weight.

[0024] The invention further includes the use of apatite in a carrier material for a fluid in a tobacco substitute with the properties and features described herein. In an embodiment apatite is used as the carrier material for a fluid in a tobacco substitute.

[0025] The invention further includes the use of the tobacco substitute described herein in a tobacco pipe or waterpipe (shisha).

[0026] Finally the invention further concerns a method of producing a tobacco substitute in which a carrier material which includes apatite or consists of apatite is charged with a fluid, wherein

[0027] in a first step the apatite and optionally additives are provided in a mixer with agitation,

[0028] in a second step the fluid is added with continued agitation and blended with the provided apatite and optionally additives, and

[0029] in a third step the resulting mass is shaped or pressed to form tablets.

[0030] In an embodiment of the method according to the invention in the first step a vacuum is further applied, which is maintained in the second step. The vacuum provides that the fluid is drawn into the mixer. The shaping operation in the third step can be effected by extrusion, compacting or injection molding.

[0031] In an embodiment of the method according to the invention tablets of a diameter in the region of between 2 mm and 2 cm are produced, wherein a pressing pressure of between 60 MPa and 300 MPa is used and optionally a pre-pressing pressure of between 20 and 100 MPa.

EXAMPLES

Example 1

Aerosol Development and Flavor

[0032] In this example aerosol development of different tobaccos and tobacco substitute materials were compared together.

[0033] For that purpose a hydroxylapatite having a specific surface area of 80 m^2/g (CAS-No 1306-06-5: which can be obtained from Chemische Fabrik Budenheim KG, Budenheim, Germany), is charged with a commercially available flavor fluid which contains glycerin, glucose, water, natural flavors and food dye (raspberry flavor fluid, which can be obtained from Aladin Shisha, Wiesbaden, Germany, website: www.bigg-steam.com). The apatite charged with the flavor fluid was used in the form of a mass pressed to constitute tablets (sample b)). In a further approach a tablet which had already been used in accordance with sample b) was charged again with flavor fluid (sample d)).

[0034] In sample b), prior to the tabletting step, the apatite was charged with 25% by weight of flavor fluid, with respect to the total weight of apatite and flavor fluid. The tablets used in sample d) were produced as for sample b) and after a use as described below in a waterpipe introduced again into flavor fluid, with a marked excess of flavor fluid being used.

[0035] After blending of the constituents for sample b) and sample d) respectively prior to the first use the mass was pressed in a tablet press under a pressing pressure of 210 MPa to constitute tablets.

[0036] As comparative samples vapor stones (Shiazo Steam Stones Raspberry, Shiazo/ASA GmbH) in sample a) and waterpipe tobacco (Al Ajamy Kirsch Aroma) in sample c) were used.

[0037] For the test, a waterpipe bowl was filled with the materials specified in Table 1, covered with a perforated aluminum film and a vapor or aerosol development operation was initiated by applying glowing coal.

[0038] The operation of ascertaining the aerosol density was effected by optical comparison and the flavor developed was subjectively assessed by four test persons. Evaluation was effected within a 30 minute period of time after ignition of the waterpipe.

[0039] Assessment was effected by specifying better (+), equal (0) and worse (−) in comparison with sample b) as the reference. The results of the test are set out in Table 1, the last column specifying the respective assessments of the four test persons.

TABLE 1

Sample	Material	Aerosol density	Flavor/taste
a)	Vapor stone in flavor fluid	Very thin	−/−/0/+
b)	Tablets, 25% flavor fluid	Very dense	0/0/0/0 (reference)
c)	Aromatized waterpipe tobacco	Very dense	0/0/+/+
d)	Tablets, re-used	Very dense	0/+/0/0

[0040] The test persons assessed the tobacco substitute according to the invention which was used as sample b) in

respect of flavor/taste as well as aerosol formation as being similar to the conventionally employed aromatized waterpipe tobacco, but could at least not attribute thereto any marked advantages over the tobacco substitute of sample b).

[0041] A conventional commercially available tobacco substitute (sample a)) which was also used in the test was assessed both in respect of aerosol development and also flavor/taste as being worse than a tobacco substitute according to the invention.

[0042] In addition even the re-used tobacco substitute of sample d) was assessed as being similarly positive to sample b).

[0043] In addition to the results set out in Table 1 it was noted that tablets according to the invention which had already been used can remain for up to two hours in flavor fluid without degrading. This confirms that the tablets according to the invention after use can be again charged with fluid and used.

Example 2

Long-Term Apatite Tablets Charged with Flavor Fluid

[0044] This experiment involved testing whether a carrier material including apatite is capable of providing a tobacco-like smoking experience during a period of time which is usual for consumption using a waterpipe.

[0045] The tablets used for this test and charged with flavor fluid were of the following composition:

[0046] 75% by weight of hydroxylapatite (with a specific surface area of 80 m^2/g, from Chemische Fabrik Budenheim KG), and

[0047] 25% by weight of flavor fluid (raspberry fluid, www.bigg-steam.com)

[0048] For production of the tablets the apatite was charged with the flavor fluid by means of a Stephan mixer. The apatite was put in the mixer. The flavor fluid was then added by way of a funnel. The fluid was uniformly distributed in the apatite by the mixing operation. The charging operation lasted for 5 minutes. The apparatus was then opened and small residues on the cover were returned to the mixture. A 1-minute post-mixing phase was effected.

[0049] Tabletting was effected in a tablet press (Fette 102i, Fette Compacting GmbH, Schwarzenbek, Germany) under a pressing pressure of 105 MPa. The finished tablets on average were of a mass of 396.1 mg and had a breaking strength of 106 N (measured on a tablet tester from ERWEKA GmbH, Heusenstamm, Germany).

[0050] In the test a waterpipe bowl was filled with waterpipe tobacco (sample aa)), tablets (sample bb)) or commercially available vapor stones (sample cc)), Aladin Shisha, Wiesbaden, Germany, website: www.shiazo.com), covered with a perforated aluminum film and vapor development was started by applying glowing coal. All samples were consumed with the usual period of time of 45-60 minutes.

[0051] Assessment was effected as described above for example 1, the pipe tobacco serving as a reference. The results are set out in Table 2:

TABLE 2

Sample	Material	Aerosol density	Comments
aa)	Waterpipe tobacco with raspberry flavor	Dense	Dense vapor. After 55 minutes still a pleasant taste, no rasping in the throat
bb)	Tablets, 25% flavor fluid	Dense	Right at the beginning dense vapor development (30 seconds), after 45 minutes the flavor was weaker and the vapor less dense
cc)	Vapor stones with raspberry flavor	Thin	In the first 2 minutes very thin vapor, no flavor. After 5 minutes the vapor became denser but less strongly than with the tobacco. After 45 minutes the flavor became weaker and the vapor density decreased.

[0052] As in example 1 sample b), when using sample bb) it was possible to provide a dense aerosol subjectively comparable to the conventional tobacco (sample aa)). The duration of the possible use at 45 minutes is approximately as long as with conventional waterpipe tobacco which generally can be used for about 60 minutes. With conventional vapor stones the vapor density was less high. In addition with sample bb) dense vapor development could be observed immediately while with sample cc) a noticeable vapor development was found to occur only after 5 minutes.

1. A tobacco substitute, in particular for use in a waterpipe (shisha), tobacco pipe or electronic cigarette, comprising a liquid fluid and a carrier material for the fluid, characterised in that wherein the carrier material includes apatite.

2. The tobacco substitute as set forth in claim **1**, wherein the carrier material has an apatite proportion of between 70% by weight and 100% by weight with respect to the total weight of the carrier material.

3. The tobacco substitute as set forth in claim **1**, wherein the apatite has a specific surface area of more than 60 m^2/g, measured using the BET method in accordance with DIN-ISO 9277 2003-05.

4. The tobacco substitute as set forth in claim **1**, wherein the carrier material is in the form of a pressed tablet.

5. The tobacco substitute as set forth in claim **1**, wherein the fluid has a water content in the region of between 0% by weight and 50% by weight, with respect to the total volume of the fluid.

6. The tobacco substitute as set forth in claim **1**, wherein the fluid includes an active substance and/or a flavor substance.

7. A method comprising adding apatite as a carrier material to a fluid in a tobacco substitute.

8. A method comprising adding the tobacco substitute as set forth in claim **1** to a tobacco pipe or waterpipe (shisha).

9. A method of producing a tobacco substitute in which a carrier material which comprises apatite or consists of apatite is charged with a fluid, comprising

providing the apatite and optionally additives in a mixer with agitation,

blending the fluid with continued agitation and with the provided apatite and optionally additives to form a resulting mass, and

shaping or pressing the resulting mass to form tablets.

10. The tobacco substitute as set forth in claim **4**, wherein proportion of fluid to the carrier material is between 2% by weight and 55% by weight with respect to the total weight of the carrier material with fluid.

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