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(54) **Particles for tobacco products**

(57) The present invention relates to tobacco products comprising particles having similar properties of real cloves. Said particles have the ability to generate the desirable crackling sound and odour similar to that of natural cloves during smoking.

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Description

[0001] The present invention relates to particles having similar properties of cloves and to their use in tobacco products.

[0002] The formation of tar during smoking of cigarettes is a serious health risk factor. Therefore, there is a strong pressure to reduce the formation of tar during smoking. Several approaches are being used to reduce tar production and consumption during smoking. The use of cigarette filters and the development of low tar delivery smoking compositions are a few examples of solutions used to reduce tar delivery.

[0003] Cloves are used in tobacco products, which are often called "kretek" cigarettes, in order to achieve a desirable crackling effect and for the additional flavour benefit. However, cloves generate an additional risk of tar production during smoking and therefore their use is inconsistent with attempts to reduce tar production and consumption. Another problem associated with the use of cloves is the fluctuation in the quality and price of natural cloves.

[0004] Accordingly, there is a need to provide tobacco products, which have the desired properties of natural cloves such as for example the audible crackling sound during smoking and the taste and odour, but which do not add appreciably to the tar content.

[0005] GB 1284151 discloses smoking articles comprising a plurality of minute capsules having a diameter between 50 to 500 microns. These capsules containing an oil as an inner phase rupture with an audible crackling sound during smoking. It is stated that these capsules should not exceed 500 microns in diameter and should not be less than 50 microns, since smaller capsules fail to rupture with an audible crackling, and larger capsules may separate too easily from the tobacco during manufacture and storage. One disadvantage of such minute capsules is that a smoker can barely feel and/or see the difference between a product comprising such capsules and a product without such capsules. This is a disadvantage because not only the audible crackling sound but also the visibility of particles similar to cloves are properties desirable for smoking articles marketed in certain countries in the Far East such as Indonesia. Another disadvantage associated with the use of capsules, and particularly capsules at the higher end of the above-stated range is that individual capsules rupture to deliver large amounts of oil in a rapid burst rather than delivering smaller amount in a controlled manner in time. Release of large amounts of oil may also cause unsightly "spotting" on cigarette paper.

[0006] Applicant has surprisingly found that one can form clove-oil-containing particles that may have the appearance of real cloves and which provide desirable properties such as an audible crackling and a controlled release of taste and odor of cloves when burned. In addition, cigarettes containing such particles have a similar feel as cigarettes containing real cloves.

[0007] Therefore, in a first aspect the invention relates to a tobacco product containing particles of a carbohydrate matrix having dispersed therein a plurality of droplets of a crackling agent.

[0008] The carbohydrate matrix material may be selected from monosaccharides (I), disaccharides (II), oligosaccharides (III), polysaccharides (IV), starches including modified starches and hydrolysates (V), and hydrogenates of (I - V). Starches, for example native corn starch, tapioca starch and potato starch are preferred. The matrix material may optionally comprise a plasticizer such as a polyhydroxy compound, for example glycerol, sorbitol and propylene glycol, to improve the mechanical properties of the particles. Other excipients, such as coloring materials, flavorings or fragrances may also be present in the matrix material. Coloring materials that provide a brown color are preferred, e.g. E150.

[0009] To obtain the desired crackling effect the particles according to the present invention comprise a crackling agent, such as a combustible liquid. The crackling agent is inflammable and provides a crackling effect preferably at temperatures higher than 400°C. The crackling agent is preferably selected from the group of vegetable oils, fats or other food-grade inflammable materials. A crackling agent having organoleptic properties is preferred. More preferred the crackling agent is liquid oil, preferably a flavored oil, or a flavor dissolved in an oil. The volatility of said compounds is preferably similar to that of clove oil. Especially preferred are caryophyllene, eugenol, isopropyl myristate, limonene and essential oils, such as clove bud or clove leaf oils or mixtures thereof. Essential oils are volatile oils obtained for example by steam distillation of plants. Most preferred are caryophyllene and isopropyl myristate.

[0010] The term "organoleptic" as used herein, stands for compounds having a taste and/or an odor, such as fragrance and flavor compounds that may be selected from the extensive range of natural and synthetic molecules currently available, such as essential oils, alcohols, aldehydes and ketones, ether and acetals, ester and lactones, and precursors thereof. Preferably such compounds may be used which are well known in tobacco applications and their use is not restricted by national law, for example vanillin, ethyl butyrate, methyl hexanoate, beta-ionone, ketoisophorone, emoxyfuranone (5-Ethyl-3-hydroxy-4-methyl-2(5H)-furanone), and corylone pyrazine (5H-5-Methyl-6,7-dihydrocyclopenta(b)pyrazine).

[0011] Optionally, an emulsifier such as a modified starch with emulsifying properties, for example octenyl succinate-modified starch (e.g. Capsule® from National Starch), can be used to obtain a uniform dispersion of the crackling agent in the carbohydrate matrix and to keep the amount of the crackling agent on the surface of the particles (so called

"surface oil") to a minimum. Accordingly, the crackling agent is protected against oxidation and can not result in the development of off-flavor. Further, the crackling agent can't cause spots on the cigarette paper.

[0012] Other excipients such as flavors and fragrances may be added to the emulsion.

[0013] The optimal concentration of the crackling agents may vary widely and depends on the properties of each agent but is in general between 1 to 20%, preferably between 2 to 10%, preferably 4 to 7% by total weight of the particles. The droplet size of the crackling agent dispersed in a carbohydrate matrix may vary over a wide range in different products depending on the desired release rate of the oil and of the crackling noise to be achieved. However, preferably the droplet size is between 1 to 5 microns, more preferably between 1 to 3 microns.

[0014] The particles according to the present invention may be prepared by

a) mixing the crackling agent, optionally a flavour or a fragrance and optionally an emulsifier in water to form an emulsion

b) mixing the emulsion of step a) into a carbohydrate matrix, optionally containing a plasticizer and/or other excipients by extrusion, and

c) forming particles having the desired particle size for example by cutting, breaking, grinding the extrudate of step b) and

d) optionally, drying the particles, preferably to a moisture content of 2 to 20% by weight of the particles, more preferably 2 to 5% by weight.

[0015] The equipment need to carry out the process hereinabove described are well known to the person skilled in the art and requires no detailed discussion herein. Byway of example suitable equipment for the production of the emulsion may be a high shear mixer (e.g. Ultraturrax from IKA) inserted into a stirring vessel of appropriate volume size. Alternatively a high-pressure mixer can be used. The extrusion process may be carried out by using a conventional single or double screw extruder.

[0016] In order to prevent separation of the particles from the tobacco during the production of cigarettes such particles are preferred to have a bulk density similar to that of real cloves, for example between 230 and 450g/L, preferably between 240 and 300g/L, more preferably between 240 and 270 g/L. The bulk density being similar to that of real cloves and also the irregular shape of the particles may render separation of the particles from tobacco during processing of tobacco products more difficult. In an preferred embodiment the irregular shape of the particles may have the appearance of cut cloves, more particular of cut clove buds and clove stems as used in flavoured cigarettes. Although the particles have an irregular shape they may be further described by its dimension, more particular by its length and width. Such particles are preferred having a particle size of about 0.5 to 3 mm width and of about 5 to 15 mm length, more preferably of about 1 to 2 mm width and of about 5 to 12 mm length, most preferably of about 1.5 to 2 mm width and of about 7 to 10 mm length.

[0017] The particles according to the present invention may be used to substitute cloves in various applications but in particular, in tobacco products. The particles are added to tobacco in an effective amount and the tobacco products, preferably the cigarettes are prepared from the resulting mix. Preferably, 5 to 40% by weight of the particles according to the present invention are mixed with 60% to 95% by weight of tobacco to partly or completely replace natural cloves.

[0018] The shelf life of the particles is higher than 10 years when stored in closed containers. Furthermore, the particles according to the present invention compared to natural cloves have the advantage of producing markedly smaller amounts of tar during smoking without adversely affecting the pleasures associated with smoking the tobacco product. A further advantage is that these particles have not strong quality and price fluctuations and can therefore provide a considerable cost and quality advantage.

[0019] Thus, in another aspect the invention relates to a method of incorporating such particles into a tobacco product by admixing said particles with dried, cut tobacco leaves.

[0020] The invention is illustrated by the following examples.

Example1

[0021]

A) Preparation of an emulsion

360 g Capsul @from National Starch was added to 900g water and dissolved with stirring using a high shear mixer, type Ultraturrax T50. Subsequently, eugenol (1566 g) and Tabacarome (Givaudan flavoring; 174 g) were added and the mixture homogenized for about 5 minutes. The resulting o/w emulsion was then encapsulated in a starch matrix by means of an extrusion process.

B) The extrusion was done on a Bühler twin screw lab extruder with a screw diameter of 44 mm and a length of 106 cm. Water and Flavor emulsion from step A) were added with a feeding pump. The barrel temperature was

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70 to 104°C. The extrudate leaving the die had a temperature of 85-105 °C.

An intimate dry mix of native corn starch (15.0 kg), glycerol (0.5 kg) and Caramel Color (E150d; 0.2 kg) was introduced into the extruder barrel at a rate of approximately 15 kg/hour. Water was added with a feeding pump via a separate entrance at a rate of 1.5- 4.5 kg/h at about 15 cm from the begin of the barrel. At the temperature of the barrel gelatinization of the starch takes place.

The emulsion was fed at a rate of 2-5 kg/h into the barrel, at a distance of 27 cm from the die, which is far enough to ensure intimate mixing into the gelatinized starch prior to extrusion.

C) After passing the die, the extrudate was cut, and

D) dried on a fluid bed dryer for 20 minutes at 90°C.

[0022] The process yielded particles of a flake-like shape varying in size from 10 x 2 to 5 x 1 mm. The particles, when incorporated into cigarettes, developed a nice crackling effect by burning which is very similar to the crackling effect of sliced clove buds and clove stems.

EXAMPLE 2

[0023] Same procedure as in example 1 except for the glycerol, which was added separately. So, an intimate dry mix of native corn starch (15.0 kg) and Caramel Color (E150d; 0.2 kg) was introduced into the extruder barrel at a rate of approximately 15 kg/hour. Water was added with a feeding pump at a rate of 1.5- 4.5 kg/h at about 15 cm from the begin of the barrel followed by 1.5-2.7 g of glycerol after about 20 from the begin of the barrel.

EXAMPLE 3

[0024] Same procedure as in example 2 with the following exception: After gelatinization of the starch in the extruder, the water content of the gelatinized starch was reduced by evaporation under vacuum prior to addition of the emulsion. The vacuum was generated with the aid of a vacuum pump that was connected to the barrel at a distance of approximately 17 cm before the entrance of the emulsion.

EXAMPLE 4

[0025]

A) Preparation of an emulsion

Capsul ® from National Starch (15 kg) was added to water (30 kg) and dissolved with stirring using a high shear mixer, type Ultraturrax T50, IKA. Subsequently, 55 kg of a mixture consisting of 80 parts of eugenol, 10 parts of caryophyllene and 10 parts of a tobacco flavoring were added and the mixture homogenized for about 10 minutes to obtain an emulsion with an average oil droplet size of 4-5 micrometer.

The resulting o/w emulsion was then encapsulated in a starch matrix by means of an extrusion process.

B) The extrusion was done on a Bühler twin screw extruder DNDG 62mm with a screw diameter of 62 mm and a length of 183 cm. Water, glycerin and flavor emulsion were added with different feeding pumps. The barrel temperature was 85 to 120°C.

The extrudate just before leaving the die had a temperature of 75-80 °C

Native corn starch with 2 % of Caramel Color was introduced into the extruder

barrel at a rate of approximately 100 kg/hour. Water (20 kg/h) and glycerin (12 kg/h) were subsequently fed into the barrel via two separate injection points. At the temperature of the barrel gelatinization of the starch takes place.

About halfway along the barrel there was an opening to allow partial evaporation of the water from the product in the barrel. This improves the texture of the strings exiting from the die so that these are more easily cut.

The emulsion of step A) was introduced into the barrel at a rate of 14.7 kg/h, at a distance of 65 cm from the die which is far enough to ensure intimate mixing into the gelatinized starch prior to extrusion.

C) After passing the die, the extrudate was cut, and

D) dried in a fluid bed dryer for 2 minutes at 80°C.

[0026] The process yielded particles of a flake like shape with an average size of about 8 by 2 mm. The bulk density of the dried particles (about 260 g/L) was close to that of cut clove buds (about 210 g/L).

EXAMPLE 5

[0027] Cigarettes of the following composition were prepared:

A) 100% tobacco blend

B) 62.5% by weight tobacco blend and 37.5% by weight natural cloves

C) 62.5% by weight tobacco blend and 37.5% by weight of particles prepared according to example 1 (clove replacer).

[0028] The tar production from the cigarettes was determined with the aid of a smoking machine. The results are shown in Table 1.

Table 1.

	A (no cloves)	B (natural cloves)	C (clove replacer)
Tobacco weight (g)	3.59	3.61	3.83
Nicotine (mg/g)	7.69	4.80	5.00
Tar (mg/g)	38.62	61.63	42.23
% Tar difference		+59.55	+9.33

[0029] The tar production using the "clove replacer" is substantially lower than the one of natural cloves.

Claims

1. A tobacco product containing particles of a carbohydrate matrix having dispersed therein a plurality of droplets of a crackling agent.
2. A tobacco product according to claim 1 wherein said particles are of irregular shape with the appearance of cut cloves.
3. A tobacco product according to claim 1 and claim 2 wherein said particles having a particle size of 0.5 to 3 mm width and from 5 to 15 mm length.
4. A tobacco product according to claim 1 wherein said crackling agent is inflammable at temperatures higher than 400°C.
5. A tobacco product according to any of the preceding claims wherein the crackling agent is selected from the list of vegetable oils and fats.
6. A tobacco product according to any of the preceding claims wherein the crackling agent is a flavoured oil.
7. A tobacco product according to claim 1 to claim 5 wherein the crackling agent is a flavour dissolved in an oil.
8. A tobacco product according to any of the preceding claims wherein the crackling agent is selected from the group of caryophyllene, eugenol, isopropyl myristate, limonene, and essential oils.
9. A tobacco product according to claim 1 wherein the matrix material is selected from monosaccharides (I), disaccharides (II), oligosaccharides (III), polysaccharides (IV), starches including modified starches and hydrolysates (V), and hydrogenates of (I - V).
10. A tobacco product according to claim 9 wherein the matrix material is a starch.
11. A tobacco product according to claim 9 wherein the matrix material comprises a plasticizer.
12. A tobacco product according to claim 11 wherein the plasticizer is a polyhydroxy compound.
13. A tobacco product according to any of the preceding claims wherein the matrix material comprises optionally flavours, fragrances, and/or coloring material.
14. A tobacco product according to claim 1 wherein the crackling agent optionally comprises an emulsifier, flavours

and/or fragrances.

15. A tobacco product according to any of the preceding claims wherein said particles generate an audible crackling sound at temperatures higher than 400°C.

16. A tobacco product according to claim 1 comprising up to 40% by weight of said particles.

17. Particles according to any of the preceding claims produces by

a) mixing the crackling agent, optionally a flavour or fragrance, and optionally an emulsifier in water to form an emulsion

b) mixing the emulsion of step a) into a carbohydrate matrix, optionally containing a plasticizer and/or other excipients by extrusion, and

c) forming particles having the desired particle size for example by cutting, breaking, grinding the extrudate of step b) and

d) optionally, drying the particles.

18. A process for preparing a tobacco product according to claim 1 to 15 by admixing said particles with tobacco.