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ADDITIVES FOR SMOKING TOBACCO PRODUCTS

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This invention relates to additives for smoking tobacco and, more particularly, to an improved flavorant composition and a unique method for incorporating flavorants into wrappers for smoking tobacco which permits full control of flavorant distribution, maximizes flavorant retention and utilization, and prevents flavorant deterioration without substantially decreasing porosity.

It is now well known in the tobacco art that the flavor, aroma, burning, ashing and other characteristics of various smoking tobacco products may be substantially enhanced by incorporating additives, e.g., flavorants, into the tobacco and/or tobacco wrapper, e.g., leaf tobacco, reconstituted tobacco, cigarette paper, and the like. The incorporation of such additives, particularly flavorants, has been accompanied by unforeseen problems, which have heretofore substantially reduced the effectiveness of the flavorants, increased the cost of flavorant addition, required the introduction into the product of substances other than those which are naturally occurring or which are derivatives of naturally-occurring substances, and the like.

For example, in some instances, such as in the case of costly flavorants, it is desirable to limit flavorant addition to only part of the length of the cigarette or other tobacco product, e.g., the part which is normally smoked. The increased manufacturing costs associated with such techniques as segregation of additive-containing tobacco and additive-free tobacco, and the like, are excessively high. In some instances, the desired flavorant is characterized by a high vapor pressure and/or is otherwise volatile at ordinary conditions, resulting in substantial or complete loss of flavorant prior to smoking of the tobacco product. When many flavorants are incorporated with the tobacco, instead of the wrappers, they are subject to excessive pyrolytic decomposition. Whether incorporated in the tobacco or wrapper, certain flavorants are subject to undesired chemical and/or physical deteriorative modifications caused by reaction and/or contact with, or which are catalyzed by, ingredients in the tobacco, paper, environmental atmosphere, and/or even other additives, including other flavorants.

It is therefore an object of the present invention to provide a novel tobacco flavorant composition and tobacco product containing same which is substantially free of the aforementioned shortcomings.

It is a more specific object of the present invention to provide an improved tobacco flavorant composition derived from naturally occurring, in contrast to oftentimes-flavor-incompatible artificially synthesized substances, which composition maximizes flavorant retentivity and utilization and minimizes flavorant deterioration.

It is a still further object of the present invention to provide a method of incorporating one or more flavorant additives into smoking tobacco products which permits full control of additive distribution without substantial loss of tobacco-wrapper porosity.

These and other objects of the present invention will become apparent from the following detailed description, specific examples, and appended claims.

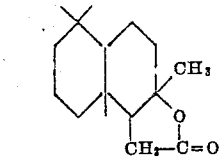
To accomplish these objectives in accordance with the broad aspects of this invention, a new composition is provided which comprises a tobacco flavorant containing a film-forming, encapsulating vehicle having as a basic chemical constituent a substance selected from the group consisting of polysaccharides, polypeptides, and mixtures thereof. In a specific embodiment the new composition is applied to a portion of a wrapper for smoking tobacco, preferably less than 25 percent of the wrapper surface, such as by streaking, usually longitudinally, by "polka-dot-type," spiral-type or irregular application, or any other desired spaced pattern. Full control of additive distribution is thus achieved by choice of the pattern of spaced application; substantial loss of flavorant by vaporization or deteriorative modification is prevented by the encapsulating or insulating barrier derived from a naturally-occurring source; and pyrolytic effects are minimized by the lower temperatures at the wrapper surfaces, in contrast to the tobacco interior, and the shorter travel path for the flavorant-containing smoke to the cooler atmosphere.

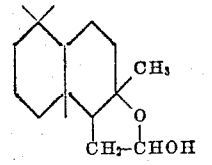
The tobacco flavorants which are employed in the flavorant composition of the present invention may be any that are known to the art which are suitable for incorporation on or into the wrapper and/or tobacco and, in addition, may also include many which are generally considered unsuitable because of their excessive vapor pressure, their instability with respect to other ingredients, including other flavorants, and/or the like. The tobacco flavorant per se is thus not the subject matter of the present invention, but rather the composition (and method associated therewith) of a tobacco flavorant, and also certain particular tobacco flavorants, having added thereto a film-forming, encapsulating vehicle derived from naturally-occurring materials, as further described hereinafter.

Examples of tobacco flavorants which may be employed in connection with the composition and method of the present invention are volatile essential oils such as bergamot oil, anise oil, wintergreen oil, bitter almond oil, bay oil, peppermint oil and the like; non-volatile essential oils such as angelica root oil, cade oil, cassia oil, clove oil, ginger oil, perfume oils including rose oil and jasmine oil, and the like; volatile aromatic chemicals such as ethyl propionate, ethyl butyrate, linalool, ethyl formate, methyl anthranilate, benzyl cinnamate, benzaldehyde, benzyl alcohol, benzyl butyrate, benzyl formate, cinnamic alcohol, ethyl isovalerate, linalyl formate, and the like. The advantages of the present invention are also particularly apparent with such flavorants as lemon oil and "Cyclotene" (2-hydroxy-3-methyl-2-cyclopentene-1-one, manufactured by Dow Chemical Company), both of which are illustrative of flavorants which would otherwise show marked deterioration and, in the case of lemon oil, loss by vaporization when employed as tobacco flavorants.

Other flavorants which may be advantageously employed when practicing the present invention include 2 - hydroxy - 2,5,5,8a - tetramethyldecahydronaphthaleneacetic acid; a salt of 2-hydroxy-2,5,5,8a-tetramethyldecahydronaphthaleneacetic acid, such as the sodium and/or potassium salt; decahydro-3a,6,6,9a-tetramethylnaphtho-[2,1-b]furan-2-one; 2 hydroxy-2,5,5,8a-tetramethyl-1-(2-

hydroxyethyl)-decahydronaphthalene; dodecahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furane; and, in particular, decahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan-2(1H)-one and dodecahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan-2-ol. All of these compounds are somewhat related to one another structurally, as is apparent, for example, from consideration of the structural formulae for the latter two, respectively, as follows:





At least one of the isomers of each of these two latter compounds may be prepared, for example, from sclareol, which is a terpene-like compound contained in the leaves of clary sage, *Salvia sclarea*. The respective methods are disclosed in Ruzicka et al., Helv. Chim. Acta 14, 570 (1931), and Hinder et al., Helv. Chim. Acta 33, 1251 (1950), ibid. 36, 1984 (1953).

The aforementioned flavorants and others known to those skilled in the field of flavorants, e.g., the flavorants disclosed in United States Patent No. 2,766,145, issued October 9, 1956, are commingled, as aforementioned, with a film-forming, encapsulating vehicle, comprising naturally-occurring polysaccharides, polypeptides, and mixtures thereof. Typically, the vehicle may include a liquid medium, such as an aqueous and/or alcoholic medium, which is subsequently substantially eliminated, usually by conventional drying techniques at ambient or elevated temperatures. Upon elimination of the liquid medium, the residual matter comprises the flavorant encapsulated within the polysaccharides and/or polypeptides. Optionally, the vehicle may also include plasticizers such as glycerine, syrups, sugars, glycols, sorbitols, and the like, to improve the film-forming characteristics of the encapsulating material.

The particular naturally-occurring encapsulating vehicle per se is not a point of novelty in the present invention. Any naturally-occurring vehicle of the indicated class which will form a vapor retardant film around the particular flavorant selected, and/or an insulating barrier to minimize contact with, for example, the tobacco, may be employed. These would include starch (including modified starches), dextrin, dextran and albumin, casein, and other protein compounds, and mixtures thereof.

Specific examples of encapsulating vehicles would include pastes made from starch such as a corn or tapioca starch; starch derivatives such as "Solvitose" HDF (an etherified starch, manufactured by W. A. Scholten Chemische Fabrieken, N.V., Foxhol, Groningen, Holland, and distributed by Morningstar, Nicol, Inc., New York, N.Y.), "Hawkeye" No. 3521 powdered starch (a formaldehyde treated starch, manufactured by Corn Products Refining Co.), and "Globe" No. 7002 white dextrin (an acid converted starch, manufactured by Corn Products Refining Co.); caseins such as Albumenoid No. 31 (acid-precipitated casein, manufactured by The Borden Company, chemicals division); and proteins such as soy bean flour. Other vehicles may include the vegetable gums such as acacia gum, tragacanth gum, and the like. In general, the starch-type encapsulating vehicles are preferred, i.e., starch and starch derivatives including the aforementioned treated and/or modified starches.

As previously indicated, the flavorant-containing encapsulating vehicle may be applied to the tobacco wrapper, e.g., cigarette paper, in any manner which will achieve the desired distribution. For example, a single or plurality of streaks may be applied (by rotating transfer wheels, ball point applicators or the like) longitudinally and/or circumferentially to the wrapper. The streak or streaks may also be applied spirally as a single or interlaced series of spirals. Where a plurality of streaks is employed, the composition of each of the streaks may be the same as, or may differ from, one another. As another alternative, the flavorant-containing encapsulating vehicle of the present invention may be applied in any other regular or irregular pattern desired, e.g., a "polka-dot" pattern. The pattern may extend partially or throughout the length of the wrapper. Regardless of pattern, the area of the wrapper covered by the composition is usually limited to less than 50 percent of the total area, preferably less than 25 percent, to prevent any substantial decrease in porosity.

In a particularly advantageous, preferred embodiment, the composition of the present invention may be applied to one or both of the overlapping surfaces of the wrapper seam so that it is not visible. In such case, the encapsulating vehicle may be selected so as to possess adhesive as well as film-forming properties and may be employed in sufficient amounts so as to supplement and/or replace the seam paste usually employed, as well as to act as the encapsulating vehicle. Encapsulating vehicles which possess suitable adhesive properties for such purposes include, for example, the aforementioned starches, modified starches, casein, and proteins, but do not normally include the vegetable gums.

The amount of flavorant incorporated on or into the tobacco wrapper varies considerably depending on a number of variables. Among these are the particular flavorant or flavorants chosen, the flavor and aroma enhancing properties of various additives per unit weight substantially differing in some cases, and on the level of flavor and aroma desired, the base level being a function of the type of tobacco employed. Typically, the flavorant concentration is in the range of 0.001 to 20.0 percent by weight, based on tobacco wrapper, e.g., cigarette paper, although it is to be recognized that in the case of certain flavorants, e.g., musk, even smaller amounts may be employed.

With respect to the encapsulating medium, the flavorant concentration may also vary widely depending both on the nature of the particular flavorant selected and the particular encapsulating vehicle. The encapsulating vehicle must be present in sufficient amounts to substantially coat the flavorant and thereby form a vapor-retardant envelope and/or a contact-minimizing insulating barrier around it. Typically, the flavorant concentration may be in the range of about 0.0001 to 20.0 percent by weight, based on vehicle.

The present invention and its advantages will be more clearly understood by reference to the following specific examples:

Example I

A composition of the present invention was formulated by preparing a water suspension of a fined powder of decahydro - 3a,6,6,9a - tetramethylnaphtho[2,1 - b]furan-2(1H)-one as a tobacco flavorant, commingling it with a formaldehyde-treated starch, i.e., "Hawkeye" No. 3521, and heating it to a temperature of 185° F. The resulting paste had the following specific composition:

Tobacco flavorant	grams	12
"Hawkeye" No. 3521	do	90
Water	ml	450
Neutral wool soap [1]	gram	0.9

[1] Blended coconut oil and fancy tallow soaps.

The resulting paste was applied as a single streak of about 3/32 inch width on the overlapping seam surface of

samples of a commercial grade cigarette paper having a length of 70 mm. The amount of paste was sufficient so that cigarettes could and were rolled therefrom by conventional techniques without necessitating the addition of further adhesive to the overlapping surfaces. The resulting cigarettes contained about 0.23 percent by weight, based on paper, of decahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan-2(1H)-one encapsulated in a film of the starch derivative.

The cigarettes containing the composition of the present invention were then evaluated by organoleptic testing. This was carried out by submitting the cigarettes to a panel of five expert smokers along with cigarettes prepared from the same tobacco and paper but not containing the composition of the present invention. All rated the cigarettes of the present invention as having a flavor and aroma characteristic of the tobacco flavorant, said flavor and aroma being substantially improved over that of the cigarettes without the composition of the present invention.

Example II

Another composition of the present invention was prepared using the same technique as described in Example I except that the tobacco flavorant employed was dodecahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan-2-ol and the proportion thereof was cut in half because of its superior flavoring power. The cigarettes produced therefrom thus contained about 0.1 percent by weight, based on paper, of the tobacco flavorant, encapsulated in a film of the starch derivative.

Organoleptic testing by a panel of expert smokers resulted in the same evaluation, i.e., a flavor and aroma characterized by the particular tobacco flavorant, said flavor and aroma being substantially improved over that of similar cigarettes without the composition of the present invention.

Example III

Additional cigarette samples embodying the present invention are prepared by commingling equal portions of the pastes prepared in Examples I and II, respectively. The commingled paste is then applied as two spaced longitudinal streaks on the exterior paper surfaces of commercial grade cigarettes, both of said streaks being approximately ⅛ inch wide at one end and tapering to 1/16 inch at the other end. The resulting cigarettes contain an average of about 0.1 percent by weight, based on paper, of decahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan-2(1H)-one and about 0.05 percent, based on paper, of dodecahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan-2-ol, both encapsulated in a film of the starch derivative.

Organoleptic testing of the cigarettes shows that the flavor and aroma of the smoke are characterized by both tobacco flavorants, said flavor and aroma being substantially improved over that of similar cigarettes without the composition of the present invention. In addition, the strength of the flavor and aroma associated with the two tobacco flavorants varies during smoking of each cigarette, the variation being desired in the present instance.

Example IV

Novel cigarette samples embodying the present invention are prepared by applying alternate 1/16 inch spirals, displaced by 180° circumferentially and ½ inch longitudinally, of two tobacco flavorants with appropriate encapsulating agents to conventional 70 mm. cigarettes. One spiral contains lemon oil encapsulated in No. 31 albumenoid, an acid-precipitated casein. The other spiral contains "Cyclotene" (2-hydroxy-3-methyl-2 cyclopentene-1-one) encapsulated in "Globe" No. 7002 white dextrin, an acid converted starch. In each case the compositions are applied to the cigarette paper in the form of aqueous suspensions, employing glycerine as a plasticizer, and thereafter are air dried at ambient temperature. The amount of each flavorant in the finished cigarettes approximates about 0.05 percent by weight, based on paper.

Organoleptic testing of the resulting cigarettes shows that the flavor and aroma characteristic of lemon oil and "Cyclotene" are substantially undiminished even after a substantial shelf-life. In addition, the flavor and aroma are substantially improved as compared with similar cigarettes without the dual flavorants.

From the above description and examples, it is apparent that the objects of the present invention have been achieved. In brief, a composition derived from naturally-occurring substances is provided which maximizes utilization and retentivity of the flavorant or flavorants and which minimizes flavorant deterioration. Further, a method of incorporating one or more flavorants into smoking tobacco products is provided which permits complete control over flavorant distribution without substantial loss of wrapper porosity.

While particular embodiments of this invention have been described hereinabove, it will be understood, of course, that the invention is not limited thereto. Many modifications will be apparent from the above description to those skilled in the art, and it is contemplated by the claims of this specification to cover any such modifications as fall within the true spirit and scope of this invention.

Having thus described the invention, what is claimed is:

1. A tobacco product comprising tobacco and a wrapper therefor, said wrapper having added to a portion thereof a tobacco flavorant encapsulated in a film-forming vehicle having as a basic chemical constituent a substance selected from the group consisting of polysaccharides, polypeptides, and mixtures thereof.

2. The tobacco product of claim 1 wherein said wrapper is cigarette paper, said tobacco flavorant is dodecahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan-2-ol, and said film-forming vehicle is a starch-type paste.

3. The tobacco product of claim 1 wherein said wrapper is cigarette paper, said tobacco flavorant is decahydro-3a,6,6,9a - tetramethylnaphtho[2,1 - b]furan-2(1H)-one, and said film-forming vehicle is a starch-type paste.

4. The tobacco product of claim 1 wherein said film-forming vehicle is a starch-type paste.

5. The tobacco product of claim 1 wherein said film-forming vehicle is a casein-based paste.

6. The tobacco product of claim 1 wherein said film-forming vehicle contains a plasticizer.

7. A method of manufacturing a tobacco product which comprises commingling a tobacco flavorant with a film-forming, encapsulating vehicle having as a basic chemical constituent a substance selected from the group consisting of polysaccharides, polypeptides, and mixtures thereof, applying the flavorant and vehicle to a portion of a tobacco wrapper, and encasing tobacco in said tobacco wrapper.

8. The method of claim 1 wherein the flavorant and vehicle are commingled prior to application to the tobacco wrapper and said flavorant and vehicle are applied only to the overlapping surfaces of the tobacco wrapper.

9. The method of claim 7 wherein said wrapper is cigarette paper, said flavorant is dodecahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan-2-ol, and said vehicle is a starch-type paste.

10. The method of claim 7 wherein said wrapper is cigarette paper, said flavorant is decahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan-2(1H)-one, and said vehicle is a starch-type paste.

11. The method of claim 7 wherein said wrapper is cigarette paper, said flavorant is a blend of dodecahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan-2-ol and decahydro - 3a,6,6,9a - tetramethylnaphtho[2,1 - b]furan-2(1H)-one, and said vehicle is a starch paste.

12. A method of manufacturing a cigarette which comprises commingling tobacco flavorant with a film-forming, encapsulating vehicle having as a basic chemical constituent a substance selected from the groups consisting of polysaccharides, polypeptides, and mixtures thereof, applying the commingled flavorant and vehicle to the overlapping surfaces of a cigarette paper, and encasing tobacco in said cigarette paper.

13. The method of claim 12 wherein said vehicle is a starch-type paste, whereby said starch-type paste serves as an adhesive for said overlapping surfaces of the cigarette paper.

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