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2,739,913

TOBACCO PRODUCT AND METHOD OF MAKING
SAID PRODUCT

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No Drawing. Application July 2, 1953,
Serial No. 365,779

3 Claims. (Cl. 131-17)

This invention relates to a new and novel tobacco product, and method of making said product, adapted for smoking. More particularly, it relates to an improved tobacco product containing, in addition to the tobacco, and in effective cooperation therewith, a material or materials which during smoking, remove certain objectionable constituents from the smoke, and the process of manufacture thereof.

Cigarettes, the most popular form of smoking tobacco, consists essentially of finely cut tobacco of different blends enclosed and wrapped in paper. In recent years, there has been a growing desire of many people to have decreased or partially removed from the smoke stream prior to entering their mouth, constituents of the smoke which are believed to be irritating to the mucous membranes of certain smokers, or otherwise thought generally harmful. Compounds such as nicotine, carbon monoxide, acrolein, aldehydes, hydrogen sulfide, hydrogen cyanide and heterocyclic nitrogen-containing compounds have been classed as such objectionable constituents.

Because of this desire for milder cigarettes, i. e., less irritating to the smoker, the use of filter-tip cigarettes has been gaining in popularity. The effectiveness of these filters varies from a purely psychological filter, which removes substantially nothing from the smoke stream, to those which remove a substantial fraction of the smoke, including both objectionable and desirable constituents. In addition to filters, some manufacturers have attempted to produce a milder cigarette, for example by the proper blending of low-nicotine variety tobaccos.

Now, therefore, I have discovered that a class of chemical compounds known as porphines can be incorporated into a cigarette or other tobacco product for smoking, resulting in a pleasant mild smoke with reduction of irritants without apparent decrease in flavor or aroma. Porphines are tetracyclic pyrroles wherein the four pyrrole rings are joined at the alpha position by methine groups to form a macrocyclic ring, having a double linkage between carbon atoms 7 and 8. Furthermore, for the purpose of my invention, the porphine must contain an ion of a metal which in compounds can exist in more than one oxidation state, such as iron, copper and cobalt.

Now, therefore, in accordance with my invention, I have devised a tobacco product, and method of making same, for smoking having incorporated therein a porphine containing an ion of a metal which in compounds can exist in more than one oxidation state.

Having now indicated in a general way the nature and purpose of my invention, the following examples are offered to give specific illustration of the practice of the invention and the advantages to be obtained therefrom and are not to be construed as limiting the same. In the examples, the ingredients are given in parts by weight unless otherwise indicated.

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EXAMPLE I

Absorption of CO by oxyhemoglobin

A 70 mm. cigarette was smoked in a smoking machine of the type described in Industrial and Engineering Chemistry, volume 28, pages 836-839 (July 1936), and the smoke passed through water. The gas was collected in a cell having sapphire windows. The infrared absorption spectrum of the gas was recorded by means of an infrared spectrophotometer. The presence of both CO and CO₂ was demonstrated by their characteristic absorption bands. This spectrum was used as the control.

A saturated solution of oxyhemoglobin was prepared. A 70 mm. cigarette of the same cut filler as above was smoked in the smoking machine and the smoke passed through the saturated solution of oxyhemoglobin. The gas was collected in a cell having sapphire windows. A spectrum was then run, scanning the frequencies characteristic of both CO and CO₂. The resulting spectrum was compared with the control spectrum and it was found that a definite material reduction of both CO and CO₂ had occurred.

It was therefore found that when oxyhemoglobin is paced in effective cooperation with the tobacco of a cigarette, a definite reduction of CO occurred in the smoke.

EXAMPLE II

1% hemin treated tobacco

A lot of cigarette tobacco, i. e., cut filler, was divided into two portions. Recrystallized hemin was dusted directly upon one portion of this tobacco in an amount of 1% by weight. Cigarettes were then made from both the hemin-treated and untreated tobacco.

The treated and untreated cigarettes were then smoked in the smoking machines described in Example I, and the smoke collected. The aldehyde content of the collected smoke was then determined by the method described in Analytical Chemistry, volume 25, No. 4, at pages 640-642.

The total aldehyde content of the smoke was determined as well as the volatile aldehydes existing in the smoke stream in the gas phase. The latter was carried out by inserting a filter, made from glass wool having a fiber diameter of from 0.5 to 1.5 microns, between the cigarette and the collection flasks.

The following table shows the results obtained. An effective removal of 53.30% of the total aldehyde content of the smoke was obtained from the hemin-treated tobacco, and 65.53% removal of the volatile aldehyde content of the residual gas phase.

TABLE I

Sample	Avg. Mgs. Aldehyde Per Cigt.	Percent Reduction
Untreated Cut Filler (Control).....	0.878	0.00
1% Hemin-Treated Cut Filler.....	0.410	1 53.30
1% Hemin-Treated Cut Filler thru Glass Wool.	0.091	2 65.53

1 Total aldehydes.

2 Volatile aldehydes, residual gas phase.

EXAMPLE III

2% hemin-treated tobacco

Example II was repeated using identical cut filler, except that 2% recrystallized hemin by weight was dusted on the tobacco. The results were as follows:

TABLE 2

Sample	Avg. Mgs. Aldehyde Per Cigt.	Percent Reduction
Untreated Cut Filler (Control).....	0.878	0.00
2% Hemin-Treated Cut Filler.....	0.719	¹ 18.11
2% Hemin-Treated Cut Filler thru Glass Wool..	0.137	² 48.11

¹ Total aldehydes.² Volatile aldehydes, residual gas phase.

EXAMPLE IV

Hemin-treated cigarettes milder

Both treated and untreated cigarettes prepared in Example III were distributed to a taste panel after having been coded to hide their identity. The hemin-treated cigarettes were judged to be definitely milder than the untreated cigarettes by the panel.

While in Example I oxyhemoglobin was placed in effective cooperation with smoking tobacco, if desired the oxyhemoglobin may be impregnated directly in the tobacco, or incorporated in a conventional-type filter tip such as cellulose, cotton, and similar material. However, since oxyhemoglobin contains protein matter, it is recommended that it be used in the filter rather than directly on the tobacco as it may impart a characteristic taste to the cigarette.

It will be noted in Example II and III that hemin was added directly to the tobacco. While it may also be incorporated in the filter, it is particularly suitable for direct addition to the tobacco since it imparts no characteristic taste to the cigarette.

It will be noted that in Examples II and III the amount of hemin was varied. The use of 1% hemin gave a greater reduction of aldehydes than 2%. However, the 2% hemin-treated tobacco is sufficiently effective to result in a milder smoke than that from untreated tobacco, as shown by the results of the taste panel in Example IV. It is therefore preferred to use not more than 2% by weight of hemin based on the weight of the tobacco contained therein. From 1 to 2% of hemin will ordinarily be used depending on the various individual tastes.

The porphine may be incorporated directly on the tobacco by dusting, spraying, dipping or the like. However, if preferred, the porphine may be incorporated in the filter material such as crepe paper, cellulose, asbestos, foil, cellophane, cotton and the like. It may be dusted on the filter material in crystalline form, or, if preferred, applied from a solution, dispersion or suspension.

As stated, the porphines of this invention are tetracyclic pyrroles wherein the four pyrrole rings are joined at the alpha position by methine groups to form a macrocyclic ring having a double linkage between carbon atoms 7 and 8. It is essential that the porphines contain an ion of a metal which in compounds can exist in more than one oxidation state, such as the ferro- and ferri-porphines. Examples of suitable porphines are hemin, heme, hemoglobin, oxyhemoglobin, reduced heme and

the like. Although the compounds shown as operable contain iron as the metal ion, other metal ions capable of existing in more than one oxidation state, such as copper and cobalt, may be used. The porphines may be obtained from naturally occurring substances by well-known methods. However, if preferred, heme, hemin, reduced heme and the like may be synthesized. Furthermore, the porphine may be in combination with a protein such as globin, for example hemoglobin, or the prosthetic group from hemoglobin, for example heme.

Although the exact constituents of smoke, and in what quantities present, are not known, various compounds have been found present which have been classed as objectionable constituents. In Example I it was shown that a porphine such as oxyhemoglobin has the ability to substantially remove carbon monoxide from the smoke stream, but its value is not so limited. In Examples II and III the addition of a porphine such as heme to tobacco resulted in the substantial reduction of total aldehydes as well as volatile aldehydes from the residual gas phase. It is believed that additional objectionable constituents such as nicotine, hydrogen sulfide, hydrogen cyanide and heterocyclic nitrogen-containing compounds are at least partially removed from the smoke stream.

Thus, by my invention, I have devised a novel cigarette or other tobacco product, and method of making said product adapted for smoking, wherein constituents which are believed to cause irritation to the mucous membranes of certain smokers or otherwise are considered generally undesirable are at least partially removed from the smoke stream. Furthermore, the compound can be incorporated either in conventional type filter tips or applied directly to the tobacco. The resulting cigarette is a mild, pleasant smoke without loss of flavor or aroma.

I claim:

1. A tobacco product for smoking having incorporated therein not more than 2% by weight of hemin, based on weight of tobacco contained therein.

2. In a process of making a filter-tip cigarette, the improved method consisting of impregnating the filter prior to its being combined with the tobacco with not more than 2% by weight of hemin based on weight of tobacco contained therein.

3. A tobacco product for smoking having incorporated therein from 1 to 2% by weight of hemin, based on weight of tobacco contained therein.

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