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PROCESS FOR IMPROVING TOBACCO

Ralph B. Elliott, Snyder, N. Y., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware

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This invention relates to the improvement of tobacco by a treatment involving bleaching the tobacco with an active oxygen-yielding bleaching agent. More particularly, the invention relates to the improvement of the color and taste of tobacco by a process which involves treatment of the tobacco with a solution of hydrogen peroxide.

In the past various procedures have been delevoped for bleaching tobacco with hydrogen peroxide. Such bleaching treatments have, however, been generally carried out either by immersing the tobacco in a bleaching solution, or by spraying the tobacco with such a solution, ordinarily a relatively dilute solution of hydrogen peroxide. The process which has now been developed is an improved treatment method involving a number of steps, in one step of which the tobacco is treated with a solution of hydrogen peroxide of relatively high hydrogen peroxide concentration, the total quantity of water present in the treating solution being restricted so that undue losses in weight of the tobacco as the result of leaching action are avoided. More particularly, the improved process with which this invention is concerned involves the steps of first treating tobacco with a highly concentrated solution of hydrogen peroxide under conditions wherein the amount of water present is limited to a definite degree, then permitting the tobacco to react with the hydrogen peroxide during a chemical reaction or heating stage, drying the tobacco to a relatively bone-dry state, and finally re-moistening the tobacco before further handling and before its use in the manufacture of the usual tobacco products.

In the past it has been proposed to treat tobacco with a solution of hydrogen peroxide of high concentration, the quantity of water present being definitely restricted within certain limits. Following this treatment, the tobacco has been allowed to stand for a period of time sufficient to induce chemical reaction, then dried to a bone-dry state, and finally moistened as by steaming prior to its utilization in preparing tobacco products. This treatment has, however, been carried out with unfermented tobacco, i. e., tobacco in the dry condition, directly as it comes from the tobacco drying sheds and before it has been subjected to any natural action such as fermentation. Such unfermented tobacco, dried in the tobacco drying sheds, has a fairly high moisture content, and it is therefore necessary to restrict the quantity of water present during that phase of the process wherein the tobacco is treated with hydrogen peroxide in order that too large an amount of water may not be present. As distinguished from this procedure, the invention with which this application is concerned operates with fermented tobacco, i. e., tobacco which has already been subjected to the natural fermentation action. When operating with tobacco which has been fermented, as distinguished from tobacco which has merely been dried in tobacco drying shreds, it is possible to permit the presence of a larger quantity of water during the step of bleaching the fermented tobacco with hydrogen peroxide. Accordingly, this invention is distinguished from known procedures which have been suggested for application to unfermented tobacco by the fact that I operate with tobacco which has already been fermented, and while the quantity of water present during the bleaching step must be restricted, the permissible quantity of water per one hundred pounds of tobacco being treated is greater than in the case of unfermented tobacco. One reason for this may be said to reside in the fact that tobacco, with which this invention is concerned, has a lower content of moisture than tobacco which has merely been preliminarily dried without fermentation in tobacco drying sheds.

Accordingly, it is an object of this invention to provide an improved method for the treatment of fermented tobacco whereby certain properties of the tobacco, particularly the color, taste, and aroma thereof, are substantially improved. A further object of this invention is the provision of an improved method for treating tobacco known in the trade as fermented tobacco in order to improve the color and taste thereof, this method involving the use of a solution of hydrogen peroxide of relatively high concentration under conditions in which the quantity of water present is definitely restricted within certain limits. These and still further objects of the invention will be apparent from the ensuing disclosure of certain improved embodiments thereof.

The fermented tobacco is first moistened with an ammoniacal solution of hydrogen peroxide. Preferably, the tobacco is sprayed with a solution of hydrogen peroxide of such quantity or volume as compared to the tobacco that substantially all of the solution sprayed on the tobacco remains in the tobacco. Ordinarily the tobacco leaf, after being steamed and stemmed, is piled up in some storage space or on the floor and this mass of tobacco is sprayed with the ammoniacal solution of hydrogen peroxide. In some cases the tobacco is sprayed with the ammoniacal solution of hydrogen peroxide during its passage through a

rotating tumbler, and then piled in storage piles.

I have found that the concentration of the solution of hydrogen peroxide employed for spraying the fermented tobacco should be at least 11% H_2O_2 concentration by volume. Ordinarily it is preferred to utilize solutions which have a concentration of 15% H_2O_2 by volume, although concentrations ranging from 11% H_2O_2 to 20% H_2O_2, or even, in some instances, higher, are also utilizable. The concentrations specified are in all instances the percentage of H_2O_2 by volume in the ammoniacal treating solution.

The solution of hydrogen peroxide which is sprayed on the tobacco is one which has been rendered alkaline by the addition of ammonia or ammonia water. Ordinarily it is preferred to utilize a solution which has a pH value falling within the range 9.0 to 11.0. A solution with a pH falling within a somewhat narrower range, 9.5 to 9.7, will ordinarily give superior results and is the preferred solution.

In preparing the ammoniacal solution of hydrogen peroxide, ordinarily a definite volume of water and a definite volume of aqua ammonia are added to any commercial 100 volume solution of hydrogen peroxide such as the commercial solution sold under the trade mark "Albone." It is of course not necessary in preparing my bleaching bath to utilize commercial hydrogen peroxide solution of any specified concentration, or of any specified source of manufacture. However, the commercial 100 volume solution is a convenient starting material, although solutions of other concentrations, or even in some instances other peroxygen compounds such as sodium peroxide, can be utilized to prepare the bleaching bath utilized in my improved process.

It may here be noted that the "volume concentration" of a commercial solution of hydrogen peroxide is the number of volumes of oxygen gas, measured at 0° C. and 730 mm. mercury pressure, that are released from one volume of the solution at 20° C. A commercial solution widely sold is of 100 volume concentration. Such a solution contains 30% H_2O_2 by volume, i. e., 30 grams of H_2O_2 per 100 cc. of the solution of hydrogen peroxide. The concentration of H_2O_2 by weight in the commercial 100 volume solution is 27.6%, i. e., 27.6 grams of H_2O_2 per 100 grams of solution. Under some circumstances commercial solutions of volume concentration greater than 100 volume are available, and these solutions can of course be utilized in preparing my bleach bath. Similarly, solutions of lower volume concentration are also suitable.

Since the quantity of water present per 100 pounds of tobacco being treated with my bleaching solution is of importance, it is necessary to restrict the quantity of solution sprayed on each 100 pounds of tobacco being treated. Thus, while the quantity of water added to the commercial hydrogen peroxide solution used for preparing the bleach bath is determined by the desired concentration of H_2O_2 in the bleach bath, the volume of the commercial hydrogen peroxide solution utilized, as well as the volume of water added thereto, are also of importance. The ratio of the quantity of water added, both as such and as part of the aqua ammonia, to the particular quantity of "Albone" or other commercial solution of hydrogen peroxide selected, is so chosen that the concentration of H_2O_2 by volume in the treating solution falls within the range 11% to 20%. The quantity of aqua ammonia added is an amount sufficient to adjust the pH value of the solution of hydrogen peroxide to one within the range 9.0 to 11.0, preferably to one within the narrower pH range 9.5 to 9.7. But the total quantity of water present per 100 pounds of tobacco being treated by spraying the solution on the tobacco is also of importance and is regulated in the manner now to be described.

It has been found that the ratio of the total quantity of water present in the ammoniacal solution of hydrogen peroxide to the weight of the tobacco being treated should fall within certain definite limits. It is accordingly necessary to restrict the total quantity of water present within definite limits. I have ascertained that for every 100 pounds of stemmed, fermented tobacco being treated the total quantity of water from all sources present in the treating solution should not be less than 21 pounds and should not exceed about 35 pounds. This means that for every 100 pounds of fermented tobacco being bleached in accordance with my improved method, the quantity of water present in the solution of hydrogen peroxide should not be less than approximately 10 quarts and should not be greater than about 17 quarts. Preferably, I prefer to have the ratio of water present in the bleaching solution to the weight of the tobacco being treated about as 27 is to 100; or 27 pounds of water per 100 pounds of tobacco being treated. This means that the total quantity of water from all sources present in the treating solution per 100 pounds of tobacco being treated should be approximately 13 quarts. However any quantity of water present within the limits previously specified, 10 quarts to 17 quarts per one hundred pounds of tobacco, will give the improved results characteristic of my method.

In preparing the solution of hydrogen peroxide, the amount of water added to the commercial 100 volume hydrogen peroxide solution, or other solution used to prepare the treating agent, should be selected so as to secure a volume concentration of peroxide within the values previously specified. But the total amount of solution available, including the liquid added with the hydrogen peroxide, water, and aqua ammonia present as alkalining agent, should be such that the total amount of water present in the treating solution per 100 pounds of fermented tobacco being treated shall fall within the limits previously specified, i. e., 21 to 35 pounds of water per 100 pounds of tobacco. It is essential that the total quantity of water present be thus restricted, in order that satisfactory results shall be secured in my improved process starting with fermented tobacco of relatively low moisture content as the initial starting material.

If the tobacco is exceptionally dry, the proportion of water may be discreetly increased toward the upper limit of 35 pounds per 100 pounds of tobacco being treated. Certain tobaccos which may be exceptionally dark or heavy may be improved by using concentrations of hydrogen peroxide toward the upper limit specified, i. e., 30% H_2O_2 by volume. When treating heavy, waxy types of tobacco, for example high-carbohydrate tobaccos of the Virginia type, the treatment with hydrogen peroxide is facilitated by the inclusion in the solution to be sprayed of a very small amount of a penetrating agent such as the sulfated or sulfonated wetting agents "Aerosol" or "Gardinol."

After the steamed and stemmed tobacco has been sprayed with the treating solution, the sprayed tobacco is then piled loosely on the floor or in a box to a depth of approximately two feet,

covered with canvas or some other covering material, and allowed to react for a certain period of time. The first intense heat lasts from four to eight hours, and it is during this period that most of the changes occur. However, it is recommended that the reaction be allowed to proceed for a total of from sixteen to twenty-four hours. The temperature within the tobacco during this heating or reacting stage is frequently examined, and if it exceeds 120° F. the tobacco must be aired and cooled in order to prevent "cooking."

At the conclusion of the reaction or heating step, the tobacco is thoroughly dried to a bone-dry state (e. g., 6–8% moisture content) at a temperature of 180 to 220° F. An aqueous extract from this dried tobacco should show a negative test for the presence of peroxide when treated with some test material such as potassium iodide-starch. A positive test indicates insufficient drying, and the drying step should be continued for a further period.

It is of the utmost importance that the treated tobacco be dried at this stage to practically bone-dry condition. By this step there is secured substantially complete removal or decomposition of residual peroxide and of irritating by-products formed during the course of the reaction. These by-products, which are formed by oxidation of the resins and lignins present, are in great part volatile, but being strongly adsorbed by the tobacco must be driven off by the application of comparatively high temperatures. This step is therefore, in effect, substantially a mild pre-oxidation of the tobacco, involving the expulsion of those materials which generate irritating, volatile substances when the tobacco is smoked. After drying, the tobacco is re-moistened prior to its utilization in the manufacture of tobacco products such as pipe tobacco, cigars, or cigarettes.

It may be noted that the spray method of treating tobacco with hydrogen peroxide, as employed in my improved process, is definitely superior to the usual immersion procedure for two reasons. First, practically no weight loss by leaching occurs when the tobacco is sprayed with the hydrogen peroxide solution, while immersion of tobacco in the bleaching bath may result in a loss in weight of up to 23% or even higher. The second advantage is that the cost of treatment by the spray process is always less than that of immersion processes, since the losses in hydrogen peroxide are distinctly lower in methods wherein spraying the solution on the tobacco is practiced.

Treatment of tobacco in accordance with this process ordinarily results in a milder smoking tobacco and a tobacco of lighter color. In certain cases improved mildness is of paramount importance; in other cases the lighter color is considered the more desirable advantage. Poorer grades of burley and Virginia tobaccos, commonly used in cigarettes and pipe tobacco, often fail to age properly regardless of the length of time allowed for curing. These types of tobacco can usually be rendered milder by the improved process described involving treatment with an ammoniacal solution of hydrogen peroxide of high concentration and limited volume, allowing the reaction to proceed, and then drying the tobacco to the bone dry state. Refractory Pennsylvania and Puerto Rican type tobaccos intended for use as cigar fillers but stubborn to natural fermentation can usually be made milder by treatment in accordance with this process. It has been found that Virginia and burley tobaccos, ordinarily dark colored after fermentation, can be bleached to a lighter color, which lighter color is ordinarily associated by the buying public with milder tobaccos. I have found that dark colored burley tobacco is not only improved substantially in color, but it is also made much milder in character by treatment in accordance with the foregoing method.

As an example of my improved process for the treatment of tobacco, the following may be given:

Example

Fermented tobacco leaf, after being steamed and stemmed, was sprayed as uniformly as possible with a solution made up as follows:

	Lbs.
"Albone" (commercial 100 volume hydrogen peroxide solution containing substantially 30% H_2O_2 by volume and 27.6% H_2O_2 by weight)	13
Water	13
Aqua ammonia (specific gravity 0.91)	1

The volume of solution given is that sprayed on 100 pounds of the steamed and fermented tobacco. It will be noted that the total quantity of water present was approximately 23.1 pounds per 100 pounds of fermented tobacco.

The quantity of water present is calculated as follows:

The commercial hydrogen peroxide solution contributes 13 *lbs.*×(100.0—27.6)%=13 lbs.× 72.4%=9.4 lbs.

The ammonia contributes 1 lb.×0.7=0.7 lb.

The total quantity of water present is therefore 23.1 lbs.

The sprayed tobacco was then piled loosely on the floor, covered with canvas, and allowed to react for a period of twenty-four hours. While considerable heat was developed during this period, the temperature was frequently examined to make sure that a temperature of 120° F. was not exceeded. If a tendency for the temperature to go above 120° F. had been noted, it would have been necessary to allow the tobacco to cool somewhat to prevent "cooking." This can be accomplished by aeration or by turning the tobacco over either manually or by machine means.

At the conclusion of the reaction step, the tobacco was dried to a bone-dry condition (6–8% moisture) by treatment at a temperature of about 212° F. for a period of two hours. In order to insure complete elimination of all residual hydrogen peroxide, an aqueous extraction of the tobacco was tested and the drying continued until a negative test for peroxide was obtained.

The dried tobacco was now suitable for use in the manufacture of pipe tobacco and cigarettes. It was immediately re-moistened, however, in order that the moisture content of the tobacco should fall within the desirable limits.

It is apparent that many widely different modifications of my invention may be devised, which modifications will not depart from the spirit or scope of that invention as herein described. Accordingly, the invention is not to be regarded as restricted to preferred details or modifications given merely as illustrative, except as necessitated by the prior art and appended claims.

I claim:

1. A method of improving tobacco which comprises treating fermented tobacco with a solution of hydrogen peroxide of relatively high concentration containing at least 11% H_2O_2 by vol-

ume, there being present during said treatment a total amount of water falling within the range 21 pounds to 35 pounds of water per 100 pounds of tobacco being treated, permitting said tobacco and hydrogen peroxide to react for a period of time sufficient to bring about the desired improvement in the quality of said tobacco, and thereafter drying said tobacco to a substantially bone-dry state at a temperature within the range 180°–220° F. in order to remove residual peroxide and to volatilize off reaction by-products which are undesirable in said tobacco.

2. A method of improving tobacco which comprises treating fermented tobacco with an ammoniacal solution of hydrogen peroxide of relatively high peroxide concentration containing from 11% H_2O_2 to 20% H_2O_2, said percentages being by volume, there being present during said treatment a total amount of water falling within the range 21 pounds to 35 pounds per 100 pounds of tobacco being treated, permitting said tobacco and hydrogen peroxide to react under conditions wherein the temperature does not exceed 120° F. for a period of time sufficient to bring about the desired improvement in the quality of said tobacco, and drying said tobacco to a substantially bone-dry state at a temperature within the range 180°–220° F. by the application of heat thereto in order to eliminate residual peroxide and to volatilize off reaction by-products whose presence is undesirable in said improved tobacco.

3. A method of improving tobacco which comprises spraying fermented tobacco with an ammoniacal solution of hydrogen peroxide of relatively high peroxide concentration containing from 11% H_2O_2 by volume to 20% H_2O_2 by volume, said ammoniacal solution having a pH falling within the range 9.0 to 11.0, there being present during said treatment a total amount of water falling within the range 21 pounds to 35 pounds per 100 pounds of tobacco being treated, permitting said sprayed tobacco to react with the hydrogen peroxide under conditions wherein the temperature does not exceed about 120° F. for a period of time sufficient to insure the desired improvement in the quality of the tobacco, and then drying said tobacco to a substantially bone-dry state at a temperature within the range 180°–220° F. by the application of heat thereto in order to volatilize off undecomposed peroxide as well as reaction by-products whose presence would be undesirable in said improved tobacco.

4. A method of improving tobacco which comprises spraying fermented tobacco with an ammoniacal solution of hydrogen peroxide of relatively high peroxide concentration containing at least 11% H_2O_2 by volume, the total quantity of water present during said spraying step being restricted so as to fall within the range 21 pounds to 35 pounds per 100 pounds of tobacco being treated, permitting said hydrogen peroxide and said tobacco to react under conditions wherein the temperature does not exceed 120° F. for a period of time sufficient to bring about the desired improvement in quality, drying said tobacco to a substantially bone-dry state at a temperature within the range 180°–220° F. by the application of heat thereto in order to volatilize off residual hydrogen peroxide and undesirable reaction by-products, and then moistening said tobacco in order to adjust its moisture content within the range necessary for utilization of said tobacco in the manufacture of the commercial tobacco products.

RALPH B. ELLIOTT.

CERTIFICATE OF CORRECTION.

Patent No. 2,341,535. February 15, 1944.

RALPH B. ELLIOTT.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 9, for "shreds" read --sheds--; page 2, first column, line 41, for "780 mm." read --760 mm.--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of May, A. D. 1944.

Leslie Frazer

(Seal)

Acting Commissioner of Patents.