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PROCESS OF BLEACHING

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This invention relates to bleaching.

A principal object of this invention is the production of a process of bleaching which takes place in substantially a non-aqueous solution.

Other objects and advantages will appear as the description of specific examples of carrying out the process and the principles thereof progresses and the novel features will be particularly pointed out in the appended claims.

A specific example of the practical application of my process is the bleaching of woolen yarns. 100 grams of woolen yarn may be placed in a solution of 1000 cubic centimeters of methyl alcohol in which 30 cubic centimeters of hydrogen peroxide (H_2O_2, 30% water solution) are incorporated. As the oxygen of the hydrogen peroxide is liberated much more freely in an alkaline solution, there should also be added about two cubic centimeters of, preferably, concentrated ammonia water. The solution containing the yarn should be heated to about 60 degrees centigrade for about eight hours. An actual experiment carried out under these conditions gave a bleaching effect which was very satisfactory and the wool, upon drying, had the proper feel. About 25% of the hydrogen peroxide mixture was consumed. The strength of the crude woolen yarn used was approximately 2187 grams. The strength of the bleached wool amounted to 2183 grams. This indicated that the bleaching had no substantial effect upon the strength of the yarn.

In order to have a standard by which to judge of the efficacy of the new method of bleaching, 100 grams of the same woolen yarn were first washed in the usual way for the purpose of removing grease. This washing was done in a water bath containing two grams of soap and 1 cubic centimeter of concentrated ammonia per liter. The operation was carried out at 45 degrees centigrade. After the removal of the grease the wool was rinsed in water and then bleached for 8 hours, at 45 degrees centigrade, in a bleaching solution containing 30 cubic centimeters of hydrogen peroxide (H_2O_2, 30% water solution), and one gram of sodium triphosphate per 1000 cubic centimeters of water. Afterwards the yarn was rinsed and dried in the usual way. The yarn was found to be bleached, but not as satisfactorily as that treated by the new process. It was found that about 25% of the peroxide of hydrogen was consumed. It was also found that the strength of the bleached yarn was only 2087 grams.

The new process bleaches more satisfactorily, does not impair the strength as much, and the feel of the wool is better than by the old aqueous process.

Another specific case of bleaching is that of a skin or pelt. This pelt was put into a bleaching liquor of about 1000 cubic centimeters of ethyl alcohol containing about 15 cubic centimeters of hydrogen peroxide (H_2O_2, 30% water solution), about 0.3 cubic centimeter of concentrated ammonia water, and about 45 grams of Turkey red oil. The skin was allowed to remain in the bleaching liquor for 24 hours at about 18 degrees centigrade. The skin thus treated exhibited perfect bleaching and the complete absence of injuries or impairments.

The third specific example is the bleaching of pandan straw. Pandan "stumps" were treated with a 1000 cubic centimeters ethyl alcohol solution containing 35 cubic centimeters of hydrogen peroxide (H_2O_2, 30% water solution) for about 6 hours, at about 60 degrees centigrade, and were then finished in the usual way. The bleaching proceeded very smoothly because the chlorophyl was extracted by the alcohol.

Bleaching by the usual aqueous hydrogen peroxide method does not operate anywhere near as perfectly as the new process. The bleaching effect obtainable on pandan straw by the old aqueous solution method is rather imperfect by reason of the chlorophyl present. In order to destroy the color of the chlorophyl, it is necessary to resort to a chlorine bleach, although chlorine has a very unsatisfactory effect upon pandan straw.

In accordance with applicant's process the main fluid part of the bleaching bath would be formed of an indifferent or neutral solvent or organic liquor such as ethyl alcohol, methyl alcohol, acetone, ether, chloroform, benzine, pyridine, or amyl acetate or desired mixtures thereof. The hydrogen peroxide in water solution added to such indifferent or neutral solvents or organic liquors would be disseminated, diffused or distributed in a fine state throughout the liquid.

Applicant's new process is particularly adapted to the treatment of such materials as are likely to be affected by the customary aqueous bleaching solutions in a harmful way. Textile goods with sensitive dye-stuffs therein, certain grades of straw and articles made therefrom, fur, water unstable substances, albumin and casein should all be kept away from aqueous solutions, and consequently, are rather troublesome to bleach. By applicant's process, which may be called a "dry

bleach" process, such materials may be successfully bleached.

Applicant's process also readily lends itself to combination with certain other processes. By this combination the work ordinarily performed in two or more steps may be successfully performed in one step, for instance: Applicant's new bleaching process can be readily combined with a process of degreasing because it is readily understood that the organic solvents utilized as the main body of applicant's bleaching solution are very effective degreasing or fat solvent solutions. By thus combining applicant's new bleaching process with a degreasing process the usual pretreatment of goods with soaps and alkalis may be dispensed with.

Many bodies to be bleached have contained therein certain difficultly bleachable bodies, as for instance, chlorophyl in straw. Applicant's new bleaching process is particularly applicable to such bodies because the main body of applicant's new bleaching solution may be selected as that particular organic solvent which is particularly applicable for the solution of such difficultly bleachable bodies or substances occurring in the material to be bleached. By thus selecting the appropriate solvent for such difficultly bleachable bodies they are removed by a solvent action and do not have to be bleached.

Applicant's new bleaching process employs solutions which are such that they readily lend themselves to the addition or admixture of assistance or auxiliary substances such as soaps, Turkey red oils, oils, fats, alkalis, dye-stuffs, finishing or dressing agents, and the like, whereby the bleaching action or process may be combined with other processes to secure certain cleansing or loading effects.

Applicant's new process of bleaching may be carried out in practically all of the usual ways now known to the art. It may take place at ordinary, or raised temperatures, if necessary, up to the boiling point of the particular solvent used. It may be either in open or closed vessels, and continue until the desired bleaching effect has been brought about. It may be carried out by periodic immersion of the material to be bleached into the bleaching solution followed by squeezing out of the bleaching liquor. It may be carried out by letting the bleaching liquid trickle over the goods to be bleached, or the bleaching liquor may be sprayed upon the goods in any of the usual ways.

Goods bleached in accordance with the new method may be treated in desired, usual or customary ways after the goods have been taken from the bleaching bath, for instance, they may be warmed moderately by being conveyed over heated during drums or may be treated with cold or warm air or by a blower.

The solvents forming the major portion of the bleaching solution may be recovered by well known methods as by catching rinsings from the bleached goods and suitably treating, or by recovering the solvent evaporated from the warmed or heated goods, or from the solution exhausted insofar as bleaching power is concerned.

It is especially to be noted that the new bleaching method is particularly applicable to the bleaching of goods, such as woolen fabrics, dyed wholly or in portions with a dye which bleeds or runs when the goods are bleached in the customary aqueous bath. The bleaching of skins in the customary manner with aqueous solutions also causes difficulties which are avoided by the use of applicant's non-aqueous bleaching bath, or what might be called "dry bleach".

Although I have particularly described the principle of my process, the method of carrying out, and particular and specific substances and mixtures which may be used in practicing the process, nevertheless, it is desired to have it understood that the specific instances are illustrative merely, and do not exhaust the possible substances or mixtures usable in carrying out the process.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. The process of bleaching which consists in subjecting an article to be bleached to the action of hydrogen peroxide contained in an organic solvent not attacked by active oxygen.

2. The process of bleaching which consists in subjecting an article to be bleached to the action of an organic solvent, which is indifferent to active oxygen, containing hydrogen peroxide.

3. The process of bleaching which consists in subjecting an article to be bleached to hydrogen peroxide in a substantially non-aqueous bath neutral to active oxygen containing methyl alcohol.

4. The process of bleaching which consists in subjecting an article to be bleached to about 1% to 4% of a 30% water solution of hydrogen peroxide contained in a substantially non-aqueous bath neutral to active oxygen containing methyl alcohol.

5. The process of bleaching which consists in subjecting an article to be bleached to the action of an organic solvent, neutral to active oxygen, containing about 1% to 4% of a 30% water solution of hydrogen peroxide.

6. The process of bleaching which consists in subjecting an article to be bleached to the action of an organic solvent, neutral to active oxygen, containing about 1% to 4% of a 30% water solution of hydrogen peroxide and an alkali.

7. The process of bleaching which consists in subjecting an article to be bleached to the action of an organic solvent, neutral to active oxygen, containing about 1% to 4% of a 30% water solution of hydrogen peroxide and ammonia.

8. The process of bleaching which consists in subjecting an article to be bleached to the action of an organic solvent, neutral to active oxygen, containing about 1% to 4% of a 30% water solution of hydrogen peroxide and 0.1 to 0.4 of concentrated ammonia.

9. The process of combining scouring and bleaching which consists in subjecting an article containing fats to the action of hydrogen peroxide in a substantially non-aqueous bath neutral to active oxygen containing an organic solvent.

10. The process of bleaching which consists in subjecting an article to be bleached to the action of an organic liquid neutral to active oxygen selected from the group consisting of ethyl alcohol, methyl alcohol, acetone, ether, chloroform, benzine, pyridine, or amyl acetate, or mixtures thereof, containing hydrogen peroxide.

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