

United States Patent Office

3,030,224

Patented Apr. 17, 1962

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3,030,224

OPTICAL BLEACHES

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No Drawing. Filed Apr. 29, 1960, Ser. No. 25,543
12 Claims. (Cl. 117—33.5)

This invention relates to optical bleaches. The compounds of this invention are particularly suited to use on textile materials.

Optical bleaches are fluorescent compounds that absorb ultraviolet light and emit visible light. By such action, these compounds improve the shade of both white and colored materials.

Optical bleaches of this invention are adapted to be added to the material at the time of fabrication, e.g. at the mill in the case of textiles or paper, or at a later time. In the case of textiles, the optical bleach may be added at the time of laundering. If the optical bleach is added during a laundering step, it may be added either alone or admixed with a detergent or other cleansing agent.

According to the present invention, an optical bleach effect is obtained by treating a material with 2,4,5-triphenylimidazole (lophine) or 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole in sufficient quantity so as to cause a fluorescence of visible light when the treated material is subjected to a source of ultraviolet light. The invention also encompasses a method of producing a brightening effect on materials by applying lophine or 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole in the form of a solution to such materials and drying the treated textile materials. Particularly suited to the present invention is an aqueous solution of lophine or 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole.

By the term "solution," as used in this application, it is meant to include a dispersion and not to be limited to true solutions.

The optical bleaches of the present invention are preferably utilized in a solution concentration ranging from about 0.0001 to about 0.1% by weight of the solution. Concentrations of less than about 0.0001% do not usually improve textile whiteness and concentrations greater than about 0.1% are presently uneconomical and do not generally noticeably improve the whitening effect on the textile in proportion to the increased amounts of optical bleach in the carrier.

The following examples illustrate the invention:

Example I

Test samples of the following textile materials were scoured in the solution of sodium carbonate to remove all finishes which are placed on the cloth during manufacture:

Percalé, 180 x 180, 100% cotton
Acetate rayon crepe
Nylon marquisette
Dacron polyester-cotton broadcloth

The fabric samples were then washed in a solution composed of 50 grams of detergent that did not initially contain a brightening agent, 0.5 gram of lophine and 17 liters of water.

The water portion of the washing solution was heated to 140° F. In order to facilitate a quick dispersion throughout the washing solution, the lophine was initially dissolved in a small amount of water made slightly acid with formic acid and then added, along with the detergent, to the wash water. This solution was then transferred to a washing machine and agitated for five minutes. The sample textile materials were placed in the washing machine and washed for 30 minutes. The temperature

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of the water during the washing operation was kept at about 140° F. The samples were then passed through a hand wringer. Swatches were cut from each of the samples and allowed to rinse through five rinse cycles of the washing machine. The samples were then line dried. When compared under noontime light from a north skylight, the rinsed swatches appeared as bright as the unrinsed samples, and all were a brighter white than the control samples, indicating a good retention of the added optical bleach on each of the textile materials tested.

Example II

The procedure of Example I was repeated except 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole was utilized in place of lophine. The whitening effect of 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole was particularly noticeable in the cotton percale and the Dacron-cotton samples.

Example III

In order to test the wash-retention of lophine on textiles, samples of the textiles listed in Example I were subjected to five repeated washings in wash solutions containing lophine as described in Example I. A control sample of each textile type was then removed and the remainder of the samples subjected to five successive washings such as that described in Example I, except that no brightening agent was added to the washing solution. Comparison samples were taken after the first, second and fifth washings. The respective samples from the various washings were then line dried and visually compared with one another and with the control samples. These comparisons were made under noontime light from a northern skylight. No differences could be determined between the textile samples from the various washings. In all cases the brightness-whiteness characteristics of the washed samples appeared to be as good as the control samples which had been subjected to five successive optical bleach treatments and which had not been subjected to subsequent washing.

Example IV

In order to test the wash-retention of 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole, the procedure of Example III was repeated with the exception that 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole was utilized as the optical bleach rather than lophine. A visual comparison of samples revealed no noticeable difference in the brightness-whiteness characteristics between the respective samples after the first, second and fifth washings. No visual differences in brightness-whiteness could be determined between the control samples and the textile samples after five successive washings.

In the foregoing examples the optical bleach materials, lophine and 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole, were initially dissolved in a small amount of water made slightly acidic with formic acid. In commercial operations wherein the speed of dissolution is not a required characteristic of the optical bleach, the use of a preliminary acid solution may conveniently be omitted.

What is claimed is:

1. A textile material treated with an optical bleach selected from the group consisting of lophine and 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole so as to cause fluorescence in a visible light range when subjected to ultraviolet light.

2. A textile material treated with lophine so as to cause fluorescence in a visible light range when subjected to ultraviolet light.

3. A textile material treated with 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole so as to cause fluo-

rescence in a visible light range when subjected to ultraviolet light.

4. A method of producing a brightening effect upon textile materials which comprises treating a textile material with a solution containing an optical bleach selected from the group consisting of lophine and 2-(3,4 methylenedioxyphenyl)-4,5 diphenylimidazole.

5. A method of producing a brightening effect upon textile materials which comprises treating a textile material with a solution of lophine.

6. A method of producing a brightening effect upon textile materials which comprises treating a textile material with a solution of 2-(3,4 methylenedioxyphenyl)-4,5 diphenylimidazole.

7. A method of producing a brightening effect upon textile materials which comprises treating a textile material with a solution containing between about 0.0001% and about 0.1% by weight of the solution of an optical bleach selected from the group consisting of lophine and 2-(3,4 methylenedioxyphenyl)-4,5 diphenylimidazole.

8. A method of producing a brightening effect upon textile materials which comprises treating a textile material with a solution containing between about 0.0001% and 0.1% by weight of lophine.

9. A method of producing a brightening effect upon textile materials which comprises treating a textile material with a solution containing between about 0.0001%

and 0.1% by weight of 2-(3,4 methylenedioxyphenyl)-4,5 diphenylimidazole.

10. A method of producing a brightening effect upon textile materials which comprises treating a textile material with an aqueous solution containing between about 0.0001% and about 0.1% by weight of the solution of an optical bleach selected from the group consisting of lophine and 2-(3,4-methylenedioxyphenyl)-4,5-diphenylimidazole, and allowing the water to evaporate.

11. A method of producing a brightening effect upon textile materials which comprises treating a textile material with an aqueous solution of between about 0.0001% and about 0.1% by weight of the solution of lophine and allowing the water to evaporate.

12. A method of producing a brightening effect upon textile materials which comprises treating a textile material with an aqueous solution of between about 0.0001% and about 0.1% by weight of the solution of 2-(3,4 methylenedioxyphenyl)-4,5-diphenylimidazole and allowing the water to evaporate.

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