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MILDEWPROOFING COMPOSITION CONTAINING COPPER NAPHTHENATE AND BIS-(5-CHLORO - 2 - HYDROXYPHENYL) METHANE

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This invention relates to the mildew-proofing of textiles and especially provides a novel composition of matter for such purposes, as well as novel mildew-proofed textiles.

It is well known that textile fabrics generally are subject to attack by various fungi, particularly under hot and humid conditions. As a result of such attack, tremendous amounts of textiles are destroyed each year. This represents not only an economic waste of the textiles, but, what is often more important and costly, other materials used in conjunction with the textiles, or supposedly protected by the textiles, are also rendered useless or almost so. Thus, for example, mildewing is a particularly serious matter in connection with tents, mosquito netting, jungle hammocks, sleeping bags, etc.

I have found that textiles which are normally subject to attack by fungi especially during use under hot, humid conditions can be rendered resistant to such attack by employing, as mildew-proofing agents, bis-(5-chloro-2-hydroxyphenyl) methane and copper naphthenate, conjointly. Among the unexpected advantages of such use of these two materials is the fact that much smaller amounts of bis-(5-chloro - 2 - hydroxyphenyl) methane need be employed conjointly with copper naphthenate to give the desired fungicidal properties than were previously employed. Thus, whereas, e. g., burial tests on cotton textiles show that the minimum effective concentrations of bis-(5-chloro-2-hydroxyphenyl) methane when employed alone is about 1% on the basis of the dry weight of the untreated fabric, the same effectiveness can be obtained with only 0.3% of bis-(5-chloro-2-hydroxyphenyl) methane and 0.1% of copper naphthenate.

The reason why this effect is obtained is not understood by me, but one practical result thereof is that a more permanently mildew-proofed textile product can be made than heretofore with the use of less fungicide than heretofore, or expressed otherwise, a better product can be obtained at less cost as a result of this invention.

I have mentioned that this invention relates to the mildew-proofing of textiles. Thus I do not wish to be restricted to any particular textile but wish it understood that the invention can be practiced with all textiles which are normally subject to attack by mildew. The invention is intended to apply to cotton, line, hemp, jute, wool, casein and other textiles susceptible to fungus attack, e. g., particularly for protection against those fungi which attack cellulose fibers. Moreover, the invention is not to be restricted to any particular

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form of textile fabric and therefore is intended to apply, for example, to webbing, netting, duck, and other forms in which textiles are made. In addition, should it be desired the fibers or yarn made therefrom may be treated in accordance with this invention.

Similarly, it has been found that the present invention is not limited to any particular grade of bis-(5-chloro-2-hydroxyphenyl) methane and copper naphthenate. In this regard all that is required is that these ingredients be in form to impart fungicidal properties when applied per se to textiles in practical amounts. Thus, though copper naphthenate of commerce to my knowledge is not a chemically pure compound, it has been found to give excellent results. In this connection, the copper naphthenate presently sold by the Nuodex Products Company of Elizabeth, New Jersey, as "Nuocide copper 8" may be mentioned as a specific copper naphthenate product which may be employed herein. "Copper naphthenate," for the purpose of this invention, may be defined so as to include the copper salts of the cyclo pentane carboxylic acids occuring in petroleum having acid numbers not less than 180 on an oil free basis and containing not more than 25% of unsaponifiable matter. Accordingly, it is understood that the term "copper naphthenate" in the description and claims herein is not to be restricted to a pure compound but is to be taken to include the copper salts of the aforementioned cyclic carboxylic acids. The bis-(5-chloro-2-hydroxyphenyl) methane marketed as "G-4" may be employed herein.

Nor do I wish to be confined to any particular manner of applying the fungicidal agents to the textile material. Any method which succeeds in causing the textile to become intimately impregnated with bis-(5 - chloro - 2 - hdroxyphenyl) methane and copper naphthenate may be employed. Thus, the two agents may be applied in admixture. Also they may be dissolved in mixed polar and non-polar organic solvents, such as isopropyl alcohol and naphtha, or they may be applied as emulsions. If desired, the agents may be mixed with other ingredients such as water repellents and so incorporated into the textile. Obviously, all solvents employed should be removed under conditions which do not adversely affect the properties of the treated textile. The conditions which are to be used to remove the solvents depend, inter alia, mainly on the solvents employed and hence will vary according to the composition of the impregnating material, bearing in

mind the effect of the conditions on the textiles themselves.

It will be understood from the foregoing that the novel fungicidal composition herein provided comprises essentially bis-(5-chloro-2-hydroxyphenyl) methane and copper naphthenate. Though other proportions of these agents may be employed within the scope of this invention, so long as at least as much bis-(5-chloro-2-hydroxyphenyl) methane as compared to copper is used, it is preferred to have these materials present in the proportions of about 1 to 10 parts of bis-(5-chloro-2-hydroxyphenyl) methane to an amount of copper naphthenate equivalent to about 1 part by weight of copper, all parts being by weight.

As already noted, other ingredients may be present in the composition. Thus a mixture of polar and non-polar organic solvents such as isopropyl alcohol and VMP naphtha; water-repellent material; and even other fungicides may be employed.

In view of the possible modification of the basic bis-(5-chloro-2-hydroxyphenyl) methane and copper naphthenate composition, it is not possible to state much which is definite concerning the general physical and chemical properties of the novel composition encompassed by this invention. Thus they may be, e. g., clear solutions, or pastes, or suspensions. In preparing the composition, no special directions are thought necessary except to mention that where mixed organic solvents, i. e., polar and non-polar solvents, are used it is desirable to dissolve bis-(5-chloro-2-hydroxyphenyl) methane in the polar solvent and to add the other components to the bis-(5-chloro-2-hydroxyphenyl) methane solution.

As will be understood by those skilled in the art, the amount of fungicides "picked up," i. e., incorporated in the textile may be varied over rather wide limits. There are, however, practical limiting factors governing the amount of these fungicides which are used. Two of these factors are the increased cost and the possible adverse effects, such as weight increase and stiffness, too high an amount of the fungicides would have on the textiles. It has been found that desirable fungicidal characteristics without accompanying undesirable cost features or adverse effects on the properties of textiles can be achieved by incorporating from 0.3% to 1% of bis-(5-chloro-2-hydroxyphenyl) methane and an amount of copper naphthenate equivalent to 0.1% to 1% of copper into the textile, the amounts based on the dry weight of the untreated textile.

In order to describe the invention further, the following examples are given, it being understood that they are for purposes of illustration and are not intended to limit the scope of this invention.

Example I

A novel mildew-proofing composition was prepared as follows:

0.6 grams of bis-(5-chloro-2-hydroxyphenyl) methane was dissolved in 10 grams of isopropyl alcohol. 2.5 grams of "Nuocide copper 8" (Nuodex Products Company, Elizabeth, New Jersey) containing 8% of copper in the form of copper naphthenate was diluted with 86.9 grams of VMP naphtha and added under stirring to the solution of bis-(5-chloro-2-hydroxyphenyl) methane.

Example II

A 3-foot length of type II–*a* (U. S. Army Specification No. 6–185C, October 1, 1941), 1½" in width,

O. D. dyed cotton webbing was treated with the novel composition prepared according to Example I so that a 50% wet pick up was effected. After drying for 3 hours at 220° F. to 240° F. the sample had incorporated therein 0.3% of bis-(5-chloro-2-hydroxyphenyl) methane and 0.1% of copper as copper naphthenate.

The treated sample was then leached over a 24 hour period with 240 gallons of neutral tap water (60° F.–70° F.) prior to testing. The test procedure employed is that given in the Quartermaster Corps Tentative Specification, P. Q. D. No. 447, June 26, 1944, Soil burial method. For determining breaking strength, the grab method, modified only in that the width of the sample was the width of the webbing (i. e. 1½"), was followed.

After 56 days of test, the sample showed no loss in breaking strength. An untreated sample lost 84% in 14 days.

The foregoing illustrates the practice of this invention, which however, is not to be limited thereby but is to be construed as broadly as permissible in view of the prior art and limited solely by the appended claims.

I claim:

1. A textile product comprising textile material normally subject to attack by fungi during use having incorporated therein a composition comprising bis - (5 - chloro - 2 - hydroxyphenyl) methane and copper naphthenate in amounts sufficient to render said textile material resistant to such attack.

2. A textile product comprising cellulosic material normally subject to attack by fungi during use having incorporated therein a composition comprising bis - (5 - chloro - 2 - hydroxyphenyl) methane and copper naphthenate in amounts sufficient to render said cellulosic textile material resistant to such attack.

3. A textile product having improved mildew-resistant characteristics, comprising textile material normally subject to attack by fungi during use having incorporated therein a composition comprising about 0.3% to about 1% of bis-(5-chloro-2-hydroxyphenyl) methane and about 0.1% to about 1% of copper in the form of copper naphthenate, the bis-(5-chloro-2-hydroxyphenyl) methane being present at least in equal amount compared to the copper, the amounts specified being based on the dry weight of the untreated textile material.

4. A cellulosic textile product having improved mildew-resistant characteristics, comprising cellulosic textile material normally subject to attack by fungi during use having incorporated therein a composition comprising about 0.3% to about 1% of bis-(5-chloro-2-hydroxyphenyl) methane and about 0.1% to about 1% of copper in the form of copper naphthenate, the bis-(5-chloro-2-hydroxyphenyl) methane being present at least in equal amount compared to the copper, the amounts specified being based on the dry weight of the untreated cellulosic textile material.

5. A textile product having improved mildew-resistant characteristics, comprising textile material normally subject to attack by fungi during use having incorporated therein a composition comprising about 0.3% of bis-(5-chloro-2-hydroxyphenyl) methane and about 0.1% of copper in the form of copper naphthenate, the amounts specified being based on the dry weight of the untreated textile material.

6. A cellulosic textile product having improved

mildew-resistant characteristics, comprising cellulosic textile material normally subject to attack by fungi during use having incorporated therein a composition comprising about 0.3% of bis-(5-chloro-2-hydroxyphenyl) methane and about 0.1% of copper in the form of copper naphthenate, the amounts specified being based on the dry weight of the untreated cellulosic textile material.

7. A novel composition of matter suitable for rendering textile material normally subject to attack by fungi during use resistant to such attack, comprising bis-(5-chloro-2-hydroxyphenyl) methane and copper naphthenate.

8. A novel composition of matter suitable for rendering textile material normally subject to attack by fungi during use resistant to such attack, comprising from about 1 to 10 parts by weight of bis-(5-chloro-2-hydroxyphenyl) methane to about 1 part by weight of copper in the form of copper naphthenate, dissolved in a mixture of organic solvents comprising polar and non-polar solvents.

9. A novel composition of matter suitable for rendering textile material normally subject to attack by fungi during use resistant to such attack, comprising from about 1 to 10 parts by weight of bis-(5-chloro-2-hydroxyphenyl) methane to about 1 part by weight of copper in the form of copper naphthenate, dissolved in isopropyl alcohol and naphtha.

10. A novel composition of matter suitable for rendering textile material normally subject to attack by fungi during use resistant to such attack, comprising about 3 parts by weight of bis-(5-chloro-2-hydroxyphenyl) methane, about 1 part by weight of copper as copper naphthenate, and about 10 parts by weight of isopropyl alcohol and about 90 parts by weight of VMP naphtha.

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