

- [54] **METHOD AND COMPOSITION FOR PROVIDING ANTISTATIC AND ANTI-SOILANT PROPERTIES IN HYDROPHOBIC FIBERS**
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[56]

References Cited

UNITED STATES PATENTS

2,089,212	8/1937	Kritchevsky	260/404
2,201,041	5/1940	Katz	117/139.5 F
3,159,502	12/1964	Menin	117/139.5 CQ
3,424,680	1/1969	Van Loo et al.	117/139.5 CQ

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ABSTRACT

A method of treating hydrophobic fibrous material to provide both an antistatic and anti-soilant coating which consists of applying to the fibrous material, such as a carpet or rug, a composition containing, as the active ingredient, a condensation product of higher saturated fatty acid and either tetraethylene pentamine or triethylene tetramine.

4 Claims, No Drawings

METHOD AND COMPOSITION FOR PROVIDING ANTISTATIC AND ANTI-SOILANT PROPERTIES IN HYDROPHOBIC FIBERS

This is a continuation-in-part of Application Ser. No. 665,957, filed Sept. 7, 1967, now abandoned.

This invention relates to the treatment of material constructed of hydrophobic fibers, and it particularly relates to the treatment of such material to prevent the accumulation of static electricity while simultaneously providing anti-soilant properties to the material.

The accumulation of static electricity in materials constructed of hydrophobic fibers, particularly carpets, rugs, and the like, has been a long-standing problem. The discomforting shock of discharging static electricity through one's fingertips upon walking over carpeted flooring, especially in the arid months of winter, is a common experience. It was, heretofore, attempted to overcome this problem by applying such substances as cationic surfactants to the carpeting to render them conductive and, thereby, prevent static buildup. However, this conductivity attracted soil. In order to remove the soil, it was necessary to shampoo or dry-clean the carpet. This destroyed the antistatic coating. The more frequently the antistatic coating was applied, the greater the deposition of soil and the more frequent the necessity for further cleaning.

In accordance with the present invention, a treatment is provided whereby the carpeting, or similar hydrophobic fibrous material, is not only rendered antistatic but is also provided with increased resistance to the deposition of soil. In fact, not only is the anti-soilant property established by this treatment far greater than in fibrous materials treated with conventional cationics, but it is even greater than in materials which have not been treated with any antistatic substance at all. Furthermore, not only does the present treatment eliminate any darkening of the fibrous material, but, with regard to certain shades, it actually shows definite brightening effects. The antistatic and anti-soilant properties provided by this treatment are also relatively long-lasting as compared with other antistatic substances previously used.

In accordance with the present invention, the active agent is a condensation product of a higher fatty acid such as stearic acid, palmitic acid or mixtures thereof and tetraethylene pentamine, wherein the mol ratio between the fatty acid and the primary amino groups of the reactant amine is approximately 1.5:1. The resultant product is essentially an amido-imidazoline, but may include a minor amount of imidazoline.

EXAMPLE 1

Into a jacketed kettle, equipped with an agitator and with means for azeotropic distillation of water, total take-off distillation and vacuum stripping, was charged 445 lbs. (1.66 mol equivalence) of a mixture containing about 51 percent by weight palmitic acid and 41 percent by weight stearic acid, along with small amounts of oleic and myristic acids and having an acid number of 210; 205 lbs. (about 1.08 mols) of tetraethylene pentamine (commercial grade) and 170 lbs. toluene. The mixture was heated to 155°-160°C. under agitation for 16 hours, distilling off about 45 lbs. (2.5 mols) of water azeotropically, the toluene being returned to the reactor. When the water evolution became very slow, toluene was stripped off under reduced

pressure, ending at about 160°-170°C. and 25 inches of vacuum, during which time a further quantity of water was removed. The batch was then cooled to about 60°C. and was neutralized with 130 lbs. of glacial acetic acid, after which 260 lbs. of isopropanol were added. The product was then cooled to room temperature and set to a tannish paste containing about 65 percent solids as determined by drying at 100°C. for 2 hours. This will be referred to hereinafter as "Product A". Instead of tetraethylene pentamine, it is possible to use triethylene tetramine in equivalent molar quantities. The process is otherwise identical and the resultant product is similar and is utilizable for the same purposes. This will be referred to hereinafter as "Product B".

The products produced in the above manner are cationic, soluble in alcohol and dispersible in water, compatible with most acids, but incompatible with either anionic detergents or alkalis.

EXAMPLE 2

The same procedure and molar proportions were used as in Example 1, except that instead of double pressed stearic acid, essentially pure stearic acid, were used.

EXAMPLE 3

The same procedure and molar proportions were used as in Example 1, except that instead of double pressed stearic acid, essentially pure palmitic acid was used.

Use dilutions of the above products can be prepared either in aerosol containers or in alcohol/water blends for use in spray equipment. Lower alkyl alcohols, preferably ethyl, propyl and isopropyl alcohols, may be used as the diluent. These products cannot be combined directly with a shampoo, but can be used after the shampooing of the carpeting or the like has taken place. The following examples illustrate various types of use dilutions.

EXAMPLE 4

A clear solution suitable for spraying, was prepared by mixing, at room temperature, 1 ounce of "Product A" with about 1 pint of a solution containing 30 parts by volume water and 70 parts by volume isopropanol. In preparing this mixture, "Product A" was first dissolved in the alcohol and then the water was slowly added.

EXAMPLE 5

A clear solution, suitable for spraying, was prepared by mixing, at room temperature, 1 ounce of "Product B" with about 1 pint of a solution containing 30 parts by volume water and 70 parts by volume isopropanol. Here, too, as in Example 4, the product ("Product B" in this example), was first dissolved in the alcohol and then the water was slowly added. The resulting composition, like that of Example 4, was found to effectively coat about 16 square yards of heavy, dense, thick wool carpeting.

EXAMPLE 6

An opaque dispersion, suitable for spraying, was prepared by mixing "Product A", at room temperature, with just sufficient isopropanol to make a paste. This paste was then slowly added to about 1 pint of hot water (about 90°C.) to produce a uniform dispersion.

The same type of dispersion was prepared using "Product B".

Illustrative of various aerosol formulations embodying the present invention are those listed in the following table:

FORMULATION	I	II	III	IV
"Product A"	1.5	3.7	1.6	4.1
Isopropanol				
(anhydrous)	40.8	38.9	48.4	45.9
Water (deionized)	7.7	7.4	—	—
"Ucon 11" (Union Carbide)	—	—	25.0	25.0
"Ucon 12" (Union Carbide)	50.0	50.0	25.0	25.0

One standard size aerosol spray can of Formulation I was found to be effective for 36 square feet of thick carpeting or 90 square feet of light weight carpeting. The same was true of Formulation III. Formulation II was found to be effective at the application rate of 1 can for 90 square feet for thick carpeting and at 215 square feet for light weight carpeting. Formulation IV was found effective at the rate of 1 can for 108 square feet for thick carpeting and 270 square feet for light weight carpeting.

Although the invention has been described in relation to wool carpeting, it is within the scope of the invention to utilize the products herein as an antistatic and anti-soilant coating for any type of hydrophobic fibrous material, whether it be in the form of carpeting or any other form.

Obviously, many modifications of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of

the appended claims, the invention may be practiced otherwise than as specifically described.

The invention claimed is:

1. A coating composition for hydrophobic fibrous material consisting essentially of an (a) antistatically effective amount of an antistatic product which is essentially the condensation product of a fatty acid and an amine, said fatty acid being essentially either stearic acid, palmitic acid or a mixture of stearic and palmitic acids, and said amine being either tetraethylene pentamine or triethylene tetramine, the mol ratio of the fatty acid to the amine being about 1.5 to 1, and (b) a diluent selected from the group consisting of lower alkyl alcohols and mixtures of lower alkyl alcohols in water.

2. The composition of claim 1 wherein the diluent is a mixture of water and alcohol in a proportion of about 30:70 parts by volume.

3. The composition of claim 1 in admixture with an aerosol propellant.

4. A hydrophobic fibrous material coated with an antistatic and anti-soilant composition consisting of an antistatically effective amount of an antistatic product which is essentially the condensation product of a fatty acid and an amine, said fatty acid being essentially either stearic acid, palmitic acid or a mixture of stearic and palmitic acids, and said amine being either tetraethylene pentamine or triethylene tetramine, the mol ratio of the fatty acid to the amine being about 1.5 to 1.

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