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2,764,601

TEXTILE ASSISTANTS

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No Drawing. Application February 24, 1953,
Serial No. 338,621

7 Claims. (Cl. 260—404.5)

The present invention relates to novel textile assistants and, more particularly, to improvements in the condensation products described in U. S. Patent No. 2,304,369, issued to Morgan, et al. on December 8, 1942.

The above mentioned U. S. Patent No. 2,304,369 describes the production of textile assistants by reacting a carbamyl derivative, such as urea, with the condensation product of an aliphatic polyamine and a fatty acid, acid ester or acid chloride. The products thus obtained are suitable for a variety of uses in the treatment of textile materials, e. g., as softening, wetting, lubricating, anti-static or water-proofing agents and offer the advantage over generally similar textile assistants of being relatively resistant to yellowing on storage or when heated after application to fabrics. However, it has now been found that, despite their improved resistance to yellowing, these products still tend to yellow or become scorched when exposed to relatively high temperatures, for instance, temperatures in the neighborhood of about 135° to 210° C. This difficulty is particularly apparent in the treatment of some of the more recently developed synthetic fibres, such as nylon, Orlon and Dacron, which require processing within the temperature range recited above.

The principal object of the present invention is to provide a novel group of condensation products suitable for application to textile materials for softening, lubricating and like purposes.

A more specific object of the invention is the provision of novel textile assistants which possess improved resistance to yellowing and scorching.

A further object of the invention is the provision of improvements in the condensation products described in U. S. Patent No. 2,304,369.

Another object of the invention is to provide a group of textile assistants particularly adapted for application of synthetic fibres which normally require relatively high processing temperatures.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

The foregoing objects are accomplished, according to the present invention, by virtue of the discovery that the tendency of the condensation or reaction products, described in U. S. Patent No. 2,304,369, to yellow or become scorched on heating to temperatures of 135° to 210° C. or higher, can be virtually eliminated by further condensing one or more of these reaction products with from 2 to 15 mols of ethylene oxide, per mol of reaction product, followed by, if desired, solubilization of the resulting condensate with a suitable acid or alkylating agent.

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According to the present invention, the non-yellowing characteristics of any of the condensation products described in U. S. Patent No. 2,304,369, and hereinafter referred to as amido condensation products to distinguish from the condensation products of the invention, can be improved by further condensation with ethylene oxide in the proportions stated, i. e., 2 to 15 mols ethylene oxide per mol of amido condensation product. Specifically, the amido condensation products proposed for reaction with ethylene oxide in this invention are substituted ureas, thioureas, guanidines, biurets, guanyl ureas, or diguanidines of high molecular weight, in which each of the terminal carbamyl nitrogens has been substituted through linkage with a polyamino acid amide.

These compounds are readily prepared in the manner indicated in U. S. Patent No. 2,304,369, by reacting the carbamyl derivatives, such as urea, thiourea, guanidine salts, biuret, diguanidine, or guanyl urea with the condensation products secured from aliphatic polyamines and acids. These acids may be condensed with any of the aliphatic polyamines or substituted polyamines, such as ethylene diamine, diethylene triamine, triethylene tetramine, tetraethylene pentamine, hexa methylene diamine, hydroxy ethyl ethylene diamine, ethyl ethylene diamine, 2,2-dimethyl-1,3, diamino propane, 1,3, diamino isopropanol, beta beta diamino diethyl ether, and beta beta diamino diethyl thioether.

While the invention herein described is broadly applicable to the amido condensation products described in U. S. Patent No. 2,304,369, it has been found that particularly desirable reaction products are obtained by condensing one mol of the amido condensation product derived from two mols stearic acid, 2 mols aminoethyl-ethanolamine and one mol of urea, with from 2 to 15 mols of ethylene oxide, and thereafter solubilizing the resulting condensate by reacting same with from 0.25 to one mol of ethyl acid phosphate. Such products, and especially the product obtained using 10 mols ethylene oxide, demonstrate outstanding softening and anti-static properties on synthetic fibres while having the additional property of being unusually resistant to yellowing and scorching due to heat.

Another specific ethylene oxide reaction product which has been found to possess a resistance to scorching or yellowing remarkably superior to the condensation product from which it is derived is that obtained by condensing the amido condensation product described in the preceding paragraph with two mols of ethylene oxide followed by solubilization of the resulting condensate with acetic acid.

Condensation according to the invention can be carried out in any convenient way using widely varying reaction conditions. Generally, however, condensation is effected by heating the ethylene oxide and amido condensation product to a temperature of between 50 and 150° C., and preferably 75° C. Condensation is usually completed within about 2 to 20 hours, although the exact time involved depends upon other operating conditions, e. g., nature of the amido condensation product being reacted, quantity of ethylene oxide utilized and condensation temperature.

The condensates obtained as a result of the condensation with ethylene oxide, according to the invention, are, in many cases, directly soluble, or readily dispersible, in water. Such products as are water soluble or water dispersible are suitable without further treatment for application to textile fibres, as described, for example, in U. S. Patent No. 2,304,113, to soften, wet, lubricate or otherwise improve the characteristics of the fibres. In all cases, however, the ethylene oxide condensation products can be treated with appropriate solubilizing or alkylating agents to improve their water solubility prior

65 parts (about .08 mol) of the amido condensation product of 2 mols stearic acid, 2 mols aminoethylethanolamine and 1 mol of urea were heated to 110° C. under vacuum for 1 hour.

wherein R_1 and R_6 represent a hydrocarbon radical of at least six carbons and selected from the group consisting of a saturated alkyl group, an unsaturated alkyl group, a cycloalkyl group, an aryl group, and a terpene acid residue, and in which R_2 , R_3 , R_4 , and R_5 represent a material selected from the group consisting of hydrogen, a simple alkyl of less than five carbons, and an alkylol of less than five carbons, and in which R_3 and R_4 may further repre-

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sent a second acid polyamide chain, and in which general formula the carbamyl groups D_1 and D_2 represent a material selected from the group consisting of oxygen, sulfur, and imido groups, the number of such groups being as g ranges from 0 to 3; while in the side chains the letter A represents a material selected from the group consisting of amino—(NH)—, a simple alkyl substituted amino of less than five carbons, an alkylol substituted amino of less than five carbons, oxygen, and sulfur; and the integers f and j vary from 1 to 6, while e and l vary from 0 to 6, and m and t vary from 1 to 6.

2. A textile assistant as claimed in claim 1 wherein the amido condensation product of the stated formula is obtained from urea, a fatty acid and an aliphatic polyamine.

3. A textile assistant as claimed in claim 1 comprising the condensate obtained by heating together 10 mols of ethylene oxide and one mol of an amido condensation product of the stated formula, said amido condensation product being obtained from stearic acid, aminoethyl-ethanolamine and urea.

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4. A water-soluble textile assistant comprising the condensate of claim 3 solubilized by heating with ethyl acid phosphate.

5. The process for producing a textile assistant as claimed in claim 1 which comprises condensing by heating together from 4 to 15 mols of ethylene oxide and one mol of an amido condensation product having the formula stated in claim 1.

6. A process as claimed in claim 5 wherein the resulting condensate is solubilized by heating with a water-solubilizing compound selected from the group consisting of acids and alkylating agents.

7. Textile material treated with a textile assistant as claimed in claim 1.

References Cited in the file of this patent

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