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PROCESS OF CYANOETHYLATING CELLULOSE TEXTILES BY ADDING AN ALKYLNITRILE TO THE ACRYLONITRILE AND PRODUCTS PRODUCED THEREFROM

Harry Weisberg, New York, N. Y., assignor to Londat Aetz Fabric Co., Elizabeth, N. J., a corporation of New Jersey

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This invention relates to a method of chemically modifying cyanoethylated cellulose, and the resultant product.

Cellulose in various forms has been treated with caustic soda and acrylonitrile to produce an end product having decreased moisture absorbency, increased tensile strength, abrasion resistance, improved surface lustre, and the like.

However, as a consequence of the cyanoethylating action, and particularly with a nitrogen content of 2% or more, the thus modified cellulose becomes harsh to the touch and lacks the soft hand which is so important in the textile field.

Accordingly, an object of this invention is to provide an improved method of cyanoethylating cellulose, involving the use of an addition agent in association with the acrylonitrile treatment, which results in an end product free of harshness, having a soft hand and of uniform appearance throughout.

A further object of this invention is to provide an improved method of cyanoethylating cellulose, in which small amounts of alkylnitriles are used in conjunction with the acrylonitrile treatment of the cellulose, to produce an end product of uniform appearance and physical properties rendering the same commercially acceptable in the textile field.

The modified cyanoethylation procedure of the instant invention may be applied to cellulose in all forms thereof, but is particularly effective in the case of yarns, threads or fabrics derived from cotton, linen, ramie, jute, regenerated cellulose, wood pulp and mixtures thereof.

The cellulose is cyanoethylated by the application thereto of alkaline hydroxides and acrylonitrile, in a manner well known in the art. The reagents are applied in concentrations and under conditions such as to produce an end product having a nitrogen content by weight of 2% or more.

When applying the acrylonitrile to the alkali treated cellulose, small amounts of alkylnitriles, such as succinonitrile, beta chloroproprionitrile or adiponitrile, are added to the acrylonitrile bath, thereby producing an end product free of harshness associated with conventional syanoethylated cellulose products, and showing a soft hand and uniform appearance.

The alkylnitriles may be used in amounts ranging from about 0.1% to about 1.0% by weight of the acrylonitrile solution. The addition agent may be directly added to the acrylonitrile bath, in pure form, or may be dissolved in a suitable solvent compatible with the acrylonitrile or the solvent therefor. If necessary a mutual solvent for the acrylonitrile and the alkylnitrile, may be used.

The following examples illustrate the invention:

Example 1

Cotton fabric was impregnated with a dilute aqueous solution of sodium hydroxide for about ½ hour. The treated fabric was squeezed and then impregnated with acrylonitrile at 55° C. for 1 hour. The acrylonitrile

contained about 0.1% by weight of succinonitrile. The treated material was then squeezed and washed. The resulting product had a nitrogen content of about 3.5% by weight, showed a uniform appearance and had a soft hand.

Example 2

Cotton cheesecloth was passed through a 15% aqueous solution of sodium hydroxide for about 1 minute at at 25° C. The impregnated fabric was squeezed then soaked for about 1.5 hours in a 30% solution of acrylonitrile in carbon tetrachloride, to which was added about 0.5% by weight of the acrylonitrile solution, of succinonitrile, the succinonitrile being previously dissolved in chloroform. The thus treated fabric was then washed with water and neutralized with dilute sulfuric acid to remove any residual alkali, and again washed with water. The cyanoethylated fabric has a nitrogen content of 6% and had the feel of a soft fabric.

Example 3

Cotton fabric was treated as in Example 1, except that 0.5% by weight of beta chloroproprionitrile, calculated on the acrylonitrile bath, was added to the acrylonitrile bath. The end product was free from harshness and was of good appearance.

Example 4

Cotton fabric was cyanoethylated with acrylonitrile in the presence of aqueous sodium hydroxide until the treated material showed a nitrogen content of 12%; the acrylonitrile bath having added thereto 0.5% by weight of the bath of succinonitrile. The end product showed a soft hand.

It was found that with the addition of the alkylnitrile in amounts of from about 0.1% to about 1.0% by weight of the acrylonitrile bath, the desired soft hand and uniform appearance of the cyanoethylated cellulose was attained. Furthermore, such treatment was effective with varying degrees of cyanoethylation of the cellulose indicated by nitrogen contents of from about 2% to about 12%.

This application is a continuation in part of application Ser. No. 448,781, filed August 9, 1954, now U. S. Patent 2,724,632.

As various changes might be made in the embodiment of the invention herein disclosed without departing from the spirit of the invention, it is understood that all matter herein disclosed shall be deemed illustrative and not by way of limitation except as indicated in the appended claims.

Having thus disclosed by invention, I claim as new and desire to protect by Letters Patent:

1. The process of treating cellulose comprising impregnating cellulose textile fibers with an aqueous solution of a strong alkaline hydroxide and with acrylonitrile to produce a cyanoethylated cellulose having a nitrogen content of from about 2% to about 12% by weight, said acrylonitrile having added thereto from about 0.1% to about 1.0% by weight thereof of an alkylnitrile selected from the group consisting of succinonitrile, adiponitrile and beta chloroproprionitrile, whereby the treated cellulose has a soft hand and is of uniform appearance

2. The process of treating cellulose comprising cyanoethylating cellulose fabric with acrylonitrile to a nitrogen content of from about 2% to about 12% by weight, the cyanoethylating agent containing about 0.1% of succinonitrile calculated on the basis of the cyanoethylating reagent whereby the treated cellulose has a soft hand and is of uniform appearance.

3. Modified cyanoethylated cellulose textile fibers pro-

duced by the process of claim 1 and having a soft hand and uniform appearance.

4. The process of treating cellulose fabric comprising impregnating cellulose fabric with an aqueous solution of sodium hydroxide and then with an acrylonitrile solution to produce a cyanoethylated fabric having a nitrogen content by weight of from about 2% to about 12%, said acrylonitrile solution containing from about 0.1% to about

1.0% by weight of succinonitrile, whereby the treated cellulose fabric has a soft hand and is of uniform appearance.

References Cited in the file of this patent

FOREIGN PATENTS

571,478 Great Britain ---------- Aug. 27, 1945