

1

3,567,501

**SOFTENING AND INCREASING ABRASION
RESISTANCE OF FABRICS CONTAINING
CELLULOSE ETHERS INCORPORATING
AMINE GROUPS BY USE OF HETEROCY-
CLIC CARBONATES**

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1 Claim

ABSTRACT OF THE DISCLOSURE

This invention relates to a process for softening and for increasing abrasion resistance of fabrics. More particularly, this invention relates to a process for softening and for increasing abrasion resistance of fabrics containing cellulose ethers incorporating amine groups by use of heterocyclic carbonates.

A non-exclusive, irrevocable, royalty-free license in the invention herein described, throughout the world for all purposes of the United States Government, with the power to grant sublicenses for such purposes, is hereby granted to the Government of the United States of America.

This invention relates to softening and increasing resistance to abrasion of fabrics containing cellulose ethers incorporating amine groups by treating the fabric with heterocyclic carbonates.

A primary object of the present invention is to provide a process for softening fabrics which have amine groups attached to cellulose by an ether linkage without destroying the textile properties of the fiber and without blocking the reactive nitrogen sites. A further object is to provide a process for improving the resistance to abrasion of these fabrics containing cellulose ethers incorporating amine groups.

The use of fabric softeners to obtain improved abrasion resistance is known in prior art. However, no mention of the use of heterocyclic carbonates has been found.

The softening and increase in abrasion resistance produced by these carbonates would not be expected on the basis of their action on unreacted cellulosic fabric since such action decreases the abrasion resistance of the plain cotton almost in half and causes no noticeable softening of plain cotton—probably because it is already quite soft.

In general, in accordance with the present invention, the fabric containing cellulosic material which has had amine groups attached by ether linkages is treated by soaking in a liquid heterocyclic carbonate. In carrying out the process of the invention the fabric is allowed to soak in the liquid heterocyclic carbonate for at least one hour. As the temperature is increased the length of time in the bath will have to be proportionately decreased. The length of time must be adjusted to prevent the abrasion resistance from reaching a peak and then decreasing.

Substantially any fabric containing cellulosic ethers incorporating amine groups can suitably be employed in the present process.

On soaking the fabric, substantially any heterocyclic carbonate of the dioxolone type such as 4-methyldioxolone-2 or dioxolone-2 (glycol carbonate) can suitably

2

be employed. In carrying out the preferred softening process, the fabric is placed in 4-methyldioxolone-2 for a period of time varying from approximately one hour at 135° C. to approximately three hours at 26° C. At the end of the allotted time period, the fabric is removed from the bath and washed well with water. The fabric may be dried by any method customarily used.

The following examples illustrate but do not limit the scope of the invention.

EXAMPLE 1

An aminized cotton fabric was immersed in melted dioxolone-2 (glycol carbonate) and allowed to stand at 26° C. for three hours. The fabric was washed with water and ironed to dryness. The fabric showed no weight gain and the original nitrogen content 0.98% remained the same. The breaking strength remained the same. The abrasion resistance was increased by 20% (2006 before, 2440 after). The hand of the fabric was changed from stiff to soft. When the time in the soak was increased to 72 hours, the soft hand remained; there was no weight gain or loss; the breaking strength remained the same and nitrogen content remained the same. The abrasion resistance decreased from 2006 to 628.

EXAMPLE 2

DEAE (dimethylaminoethylated) cotton was kept in a shaking cylinder of 4-methyldioxolone-2 for one hour at 135° C. The abrasion resistance increased from 597 to 809. The hand of the material was soft. When the cotton was kept in the cylinder of 4-methyldioxolone-2 for two hours at 135° C. the abrasion resistance decreased from 597 to 362. The hand of the material was soft. The nitrogen content and breaking strength of the above samples remained the same. There was no weight gain or loss.

EXAMPLE 3

DEAE cotton was immersed in a cylinder of dioxolone-2 for one hour at 135° C. The abrasion resistance increased from 597 to 965. Nitrogen content and breaking strength remained the same. There was a very slight weight loss (~0.1%). The hand of the fabric was soft.

We claim:

1. A process for softening and for increasing abrasion resistance of fabrics containing cellulose ethers incorporating amine groups which process comprises:

- (a) treating the fabric with a compound containing the dioxolone ring selected from a group consisting of dioxolone-2; and 4-methyldioxolone-2, at a temperature from about 26° C. to about 135° C. and for a period of time from about 1 hour to about 72 hours,
- (b) washing the fabric free of excess reagents.

References Cited

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