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PROCESS FOR THE FLAME-PROOFING OF FIBROUS MATERIALS CONSISTING OF POLYESTER FIBERS AND CELLULOSE FIBERS

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ABSTRACT OF THE DISCLOSURE

Fibrous materials essentially consisting of mixtures of polyesters and cellulose are rendered fire-proof by treatment with the ammonium salt of bis-(hydroxymethyl)-phosphinic acid. This treatment improves, furthermore, the soft handle of the goods.

It is known (SVF-Fachorgan 1964, 798) that the flame-proofing agents which are effective for cellulose fibers do not flame-proof polyester fibers, for example those of polyethylene glycol terephthalate. This also applies to mixed fabrics made of both types of fibers.

Belgian Pat. 604,507 describes flame-proofing impregnations of polyester fabrics with solutions of the ammonium salts of polyvinylphosphonic acid. These impregnations, however, deteriorate the handle and render it hard.

Now, we have found that fibrous materials which consist essentially of mixtures of polyester fibers and cellulose fibers can be rendered flame-proof when they are treated with solutions of the ammonium salt of bis-hydroxymethyl-phosphinic acid.

It is surprising that this treatment does not impair the handle of the materials, but that it rather improves it and renders it softer than before. Instead of the ammonium salt of pure bis-hydroxymethyl-phosphinic acid, there may also be used the ammonium salts of industrial mixtures with its anhydration products and with mono-hydroxymethyl-phosphinic acid.

As cellulose fibers, there may be used those of natural cellulose, for example cotton, or of regenerated cellulose, for example viscose. Their mixtures with polyester fibers in mixing proportions of about 20:80 up to about 80:20, especially those with a higher polyester portion, may be subjected to the treatment of the invention in unwoven form or in the form of fabrics or knit goods, and in dyed or undyed state. The usual presence of small proportions of other known types of fibers does not affect the finishing effect.

The process of the invention is carried out by impregnating in known manner, for example on the foulard, the fibrous material at room temperature with about a 10 to about 40% solution, especially in water, of the ammonium salts of the present invention. The impregnated fabric is squeezed to an increase in weight of about 40 to about 100%. The fibrous materials are then dried in the usual manner at a temperature in the range of from about 40

to about 180° C., depending on the relative proportions of the fibres and on the dyeing.

The impregnation solutions of the present invention may, if desired, also contain other usual textile auxiliary agents, for example hydrophobing agents, oleophobing agents, pigments, and so on. Advantageously the impregnation solution can be utilized in combination with anticreasing agents, in particular with the known cycloethylene-urea derivatives.

The following examples illustrate the invention but they are not intended to limit it thereto:

EXAMPLE 1

A twill-like fabric (100 g./m.²) consisting of 70% of polyethylene glycol terephthalate and 30% of cotton was impregnated on the foulard at room temperature with an aqueous solution of 160 g./l. of bis-hydroxymethyl-phosphinic acid, which was neutralized with concentrated ammonia solution. The impregnated fabric was squeezed to effect a weight increase of about 65%. The fabric was then dried at about 100° C. The fabric, thus treated, had an agreeably soft handle and a very good flame-protecting finish, as shown by a length of burn of about 7 cm. in the test according to DIN 53,906 (German Industrial Standards) and a burn angle of about 25° in the arc test apparatus (Melliand Textilberichete 1967, pages 215–217).

EXAMPLE 2

A poplin fabric (180 g./m.²) consisting of 50% of polyethylene glycol terephthalate and 50% of cotton (warp: twisted) yarn (weft:single yarn) and dyed with Indanthren Blue RK (Colour Index No. 70,000), was impregnated with an aqueous solution of 180 g./l. of the ammonium salt of bis-hydroxymethylphosphinic acid as described in Example 1, squeezed and dried. The fabric thus treated had a soft handle and a good flame-proofing finish (length of burn 7.5 cm., angle of burn about 27°).

Similar good results were obtained by impregnating a flannel (190 g./m.²) consisting of 80% of polyethylene glycol terephthalate and 20% of viscose staple fiber and printed with Indanthrene Blue RK, and a satin type furnishing fabric (220 g./m.²) consisting of 67% of polyethylene glycol terephthalate and 33% of cotton.

EXAMPLE 3

A warp-knitted fabric (200 g./m.²) consisting of 50% of polyethylene glycol terephthalate and 50% of cotton was impregnated at room temperature on a winch beck with an aqueous solution of 180 g./l. of the ammonium salt of bis-hydroxymethyl-phosphinic acid. The fabric was then centrifuged until the increase in weight was about 80% and dried at about 80° C. The knitted fabric had a soft handle and, with a length of burn of 8 cm. and a burn angle of about 25°, it represented a good flame-proofing finish.

We claim:

1. A process for the flame-proofing of fibrous materials consisting of 20 to 80% by weight of cellulose fibers and 80 to 20% by weight of polyester fibers, which comprises impregnating said materials with an aqueous solution containing about 10 to about 40% by weight of the ammonium salt of bis-(hydroxymethyl)-phosphinic acid, squeezing said material to an increase of weight of about 40 to about 100% and drying said material.

2. The process as claimed in claim 1, wherein impregnating is carried out at room temperature and drying is effected at a temperature in the range of from 40° to 180° C.

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