# United States Patent

**Meneghini et al.**

[15] **3,654,679**

[45] **Apr. 11, 1972**


## [54] MICROVOIDING WITH ALKALI METAL HYDROXIDE A HEAT FUSED FABRIC OF POLYAMIDE WITH FIBER OCCLUDED AXIALLY ALIGNED POLYESTER MICROFIBERS


[72] Inventors: **Carlo Meneghini,** Chester; **Richard Eugene Mayer,** Richmond; **Stanley David Lazarus,** Petersburg; **Norman Barry Rainer,** Richmond, all of Va.

[73] Assignee: **Allied Chemical Corporation,** New York, N.Y.



[22] Filed: **July 30, 1968**

[21] Appl. No.: **748,615**

[52] **U.S. Cl.**.....**28/73,** 8/114.6, 8/115.5, 8/115.7, 28/76 T, 156/306, 161/150, 161/89, 161/178, 161/180, 8/DIG. 4, 8/DIG. 21

[51] **Int. Cl.**.....**D02g 3/36**

[58] **Field of Search**.....8/115.7, 125, 115.5, 114.6; 260/857; 28/73



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,516,239 | 6/1970 | Fukuda et al. | 57/140 |
| 3,135,577 | 6/1964 | Watson | 8/115.5 |
| 3,382,305 | 5/1968 | Breen | 264/171 |
| 3,470,686 | 10/1969 | Fleming | 57/140 |

FOREIGN PATENTS OR APPLICATIONS

| | | |
|---|---|---|
| 1,035,908 | 7/1966 | Great Britain |



*Primary Examiner*—Donald Levy
*Attorney*—Roy H. Massengill



[57] **ABSTRACT**

A fibrous material, which can be a filament, fabric, or a film, having increased whiteness and a desirable luster is produced by a process which comprises treating the fibrous material comprising a polyamide matrix having polyester microfibers dispersed therein with a hot, aqueous caustic solution containing about 0.5 to 10, preferably about 2 to 6, weight percent of a caustic material which can be an alkali metal oxide or hydroxide or an alkali metal salt of a weak acid which is capable of producing a pH of at least about 12.5 at a concentration of 0.1N in aqueous solution, at a temperature of at least about 95° C, for a period of time sufficient to remove a portion of the polyester microfibers to produce elongated microvoids in the fibrous material thereby increasing the whiteness and imparting a lustrous effect to the fibrous material.


**2 Claims, No Drawings**

# MICROVOIDING WITH ALKALI METAL HYDROXIDE A HEAT FUSED FABRIC OF POLYAMIDE WITH FIBER OCCLUDED AXIALLY ALIGNED POLYESTER MICROFIBERS

## BACKGROUND OF THE INVENTION

This invention relates to caustic treatment of a fibrous material. More particularly, this invention relates to caustic treatment of a fibrous material comprising a polyamide matrix having polyester microfibers dispersed therein whereby a portion of the polyester microfibers are removed to produce elongated microvoids in the polyamide matrix thereby producing a fibrous material having increased whiteness and imparting a lustrous effect to the fibrous material. In addition, the caustic treatment also produces a fabric having a desirable dry, scroopy handle.

Carpets and fabrics made from fibers comprising a polyamide matrix having polyester microfibers dispersed therein have generated considerable interest in the textile industry and their luxurious properties have made them desirable over carpets and fabrics made from other fibers. The very desirable luxurious properties achieved by the use of fibers comprising a polyamide matrix having polyester microfibers dispersed therein can be enhanced by increasing their whiteness and ability to scatter light thereby enabling them to have greater cover and soil resistance along with a desirable luster.

It is known that the appearance, cover and soil resistance of a filament, fiber or fabric are related to its optical properties such as whiteness and ability to scatter light. It has been a common practice in the past to increase the whiteness and cover of a synthetic fiber by adding a delustering substance such as titania to the fiber. This is effective with low concentrations of titania but at higher concentrations the finished article acquires a chalky, dull appearance.

## PRIOR ART

U.S. Pat. No. 2,166,740 to Karplus discloses that difficulty volatile substances such as mineral, vegetable or animal oils, fats or waxes, fatty acids, aniline, tetraline, nitro-benzene and the like and solid substances such as thorium oxide, magnesium soaps, calcium naphthenate and the like can be incorporated into viscose spinning solutions and be present in the spun viscose fiber in the form of microscopic or sub-microscopic drops or granules and which can be removed by treatment of the fiber with organic solvents to produce void spaces in the fiber which give the viscose fiber a silk-like luster. These additives are not fibrous materials and their presence weakens the fiber structure. The removal of these additives with organic solvents to produce void spaces in the fiber which give the viscose fiber a silk-like luster further weakens the fiber structure and results in severe fiber strength loss. U.S. Pat. No. 2,781,242 to Knapp discloses a process in which a polyester fabric is heat treated and then treated with a caustic solution to impart a desirable handle to the fabric which may be characterized by the adjectives lofty and luxurious or by other similarly subjective terms but does not mention any improvement in the soil resistance or cover of the fabric. Furthermore, the caustic treatment is limited to a polyester fabric and does not remove polyester microfibers from a fibrous material having a polyamide matrix to produce elongated microvoids in the polyamide matrix which increase the whiteness and impart a lustrous effect to the fibrous material nor does the caustic treatment produce a dry and scroopy handle in treated fabrics.

## SUMMARY OF THE INVENTION

It has now been found that a fibrous material comprising a polyamide matrix having polyester microfibers dispersed therein can be treated with a hot, aqueous caustic solution whereby a portion of the polyester microfibers are removed to produce elongated microvoids in the polyamide matrix thereby producing a fibrous material having increased whiteness and imparting a lustrous effect to the fibrous material. In addition, the hot, aqueous caustic treatment also produces a fabric having a desirable dry, scroopy handle.



In accordance with the present invention, a lustrous fibrous material having increased whiteness is produced by a process which comprises treating a fibrous material, which can be a filament, fabric or film, comprising a polyamide matrix having polyester microfibers dispersed therein with a hot, aqueous caustic solution containing about 0.5 to 10, preferably about 2 to 6, weight percent of a caustic material which can be an alkali metal oxide or hydroxide or an alkali metal salt of a weak acid which is capable of producing a pH of at least about 12.5 at a concentration of 0.1N in aqueous solution. The hot caustic treatment is conducted at a temperature of at least about 95° C, for a period of time sufficient to remove a portion of the polyester microfibers to produce elongated microvoids in the polyamide matrix thereby producing a fibrous material having increased whiteness and imparting a lustrous effect to the fibrous material. The caustic treatment produces a silk-like luster in filaments, conventional knitted, woven or non-woven fabrics, and a bright, almost metallic luster in films and fused fabrics as described in this specification.

The fibrous material treated in accordance with the present invention can be prepared from dispersions of polyester in polyamide such as disclosed in U.S. Pat. No. 3,369,057 to Twilley by conventional melt spinning and extrusion techniques. In addition, other dispersions of polyester in polyamide are satisfactory for purposes of this invention, including those disclosed in U.S. Pat. Nos. 3,378,055, 3,378,056, and 3,378,602; British Pat. No. 1,097,068; Belgian Pat. No. 702,813; and Netherlands Pat. Nos. 66,06838 and 66,12628, and fibrous materials can also be prepared from these dispersions by conventional melt spinning and extrusion techniques. In the drawn filaments and film treated in accordance with the present invention, the polyester ingredient is dispersed as discrete microfibers throughout the polyamide which forms a continuous phase or matrix. The polyester microfibers have average diameter not above 1 micron and preferably not above 0.5 micron. In length the microfibers vary widely, but substantially all are elongated. On the average they are at least 5 times and usually at least 20 times longer than the average diameter, typically averaging in length about 250 times their average diameter. In the drawn filaments, the microfibers lie predominantly in the direction of the filament axis. The dispersion of microfibers in the filament is substantially uniform, both lengthwise and across each filament. Typically at least 100 microfibers traverse each cross-section of each filament. The microfibers will generally have essentially round cross-section, although their diameter may vary along their length and they may taper toward their ends as a result of the shears imposed during drawing.

The fibrous material treated in accordance with this invention comprises, prior to caustic treatment, per 100 parts by weight total polyamide and polyester, about 50 parts to about 90 parts of the polyamide as the matrix and dispersed therein about 50 parts to about 10 parts of the polyester.

Suitable polyamides for use in the present invention include those prepared by condensation of hexamethylene diamine and adipic acid, known as nylon 6-6 or by polymerization of e-caprolactam, known as nylon 6.

The polyesters useful in the practice of this invention can be prepared in general by condensation reactions between dicarboxylic acids or their derivatives and compounds containing two hydroxyl groups, or materials possessing both an alcohol group and a carboxylic acid group or derivative thereof; or by the condensation-polymerication of lactones. Dicarboxylic acid derivatives which can be employed include esters, salts, anhydrides and acid halides. The monomeric species employed in the preparation of the polyesters are preferably not more highly functional than difunctional in their reactivity so as to produce essentially linear, non-crosslinked polymer structures.

Suitable polyesters for use in the present invention include those polymers in which one of the recurring units in the polyester chain is the diacylaromatic radical from terephthalic acid, isophthalic acid, 5-t-butylisophthalic acid, a naphthalene dicarboxylic acid such as naphthalene 2,6 and 2,7 dicarboxyl-

ic acids, a diphenyldicarboxylic acid, a diphenyl ether dicarboxylic acid, a diphenyl alkylene dicarboxylic acid, a diphenyl sulphone dicarboxylic acid, an azo dibenzoic acid, a pyridine dicarboxylic acid, a quinoline dicarboxylic acid, and analogous aromatic species including the sulfonic acid analogues; diacyl radicals containing cyclopentane or cyclohexane rings between the acyl groups; and such radicals substituted in the ring, e.g., by alkyl or halo substituents.

The dioxy radical representing the other principal recurring unit in the polyester chain can be an open chain aliphatic such as ethylene glycol or ether thereof, for example, the diether, or can contain rings such as those which form part of the above noted diacyl radicals. The carboxy and/or the oxy chain members can be directly attached to a ring or removed by one or more carbons therefrom, as in the 1,4 dioxymethyl cyclohexane radical.

The fabric treated in accordance with the present invention can be a conventional knitted, woven or non-woven fabric.

If desired the fabrics of this invention may be fused together in accordance with the method described in U.S. application Ser. No. 727,327, filed May 7, 1968 and retain their original fabric-like appearance. Preferably the fusion of the fabrics precedes the caustic treatment.

The fibrous material is treated with a hot, aqueous caustic solution containing about 0.5 to 10, preferably about 2 to 6, weight percent of a caustic material which can be an alkali metal oxide or hydroxide or an alkali metal salt of a weak acid which is capable of producing a pH of at least about 12.5 at a concentration of 0.1N in aqueous solution. The filaments of fiber can be wound on tubes or similar packaging devices and immersed in the hot caustic solution or the filaments or fiber can be continuously passed through the hot caustic treating solution. Similarly, the fabric or film can be wound on tubes or similar packaging devices and immersed in the hot caustic solution or the fabric or film can be continuously passed through the hot caustic treating solution. The hot caustic treating solution is maintained at a temperature of at least about 95° C with best results being obtained at the boiling point of the aqueous caustic solution, atmospheric pressure being completely suitable. Suitable alkali metal oxides or hydroxides include sodium oxide or hydroxide and potassium oxide or hydroxide with sodium oxide or hydroxide being preferred. The oxides or hydroxides of other alkali metals are less readily available and consequently more expensive, though otherwise suitable. An alkali metal salt of a weak acid is suitable if it produces a pH of at least about 12.5 at a concentration of 0.1N in aqueous solution. Suitable salts include phosphates, silicates, sulfides, and sulfites, among others. Mixtures of oxides or hydroxides or of salts or of oxide or hydroxide and salt may prove especially beneficial in application of this process to particular fibrous materials.

The fibrous material is treated with the hot, aqueous caustic solution described above for a period of time sufficient to remove a portion of the polyester to produce elongated microvoids in the polyamide matrix. The time of caustic treatment will depend upon the concentration of caustic used, the temperature of the aqueous caustic solution and the amount of polyester microfibers present in the polyamide matrix. Generally speaking, when the caustic solution is boiling, treatment times of about 5 to 70, preferably about 10 to 30, minutes will remove a sufficient amount of polyester microfibers to increase the whiteness and impart the lustrous effect to the fibrous material. Somewhat longer times may be required at lower caustic concentrations, when the caustic solution temperature is below boiling or when the content of polyester microfiber originally present is near the lower limit of about 10 weight percent. The ratio of the weight of the caustic treating solution to the weight of the fibrous material can vary depending upon the treating conditions. For most treating conditions, the weight of the caustic solution is about 20 to 60 times the weight of the material treated, however, lower or higher ratios may be used for certain treating conditions.

It is not necessary to remove all the polyester microfibers from the polyamide matrix to increase the whiteness and impart the lustrous effect in the fibrous material and it is in accordance with the present invention that it is preferred to remove only a portion of the polyester microfibers to increase the whiteness and impart the lustrous effect thus retaining most of the strength of the original fiber. The amount of polyester microfibers needed to be removed can best be correlated with the weight loss of the fibrous material after the caustic treatment. Generally speaking, a weight loss, which is substantially all polyester microfibers, of about 3 to 20, preferably about 5 to 15, weight percent (depending upon the amount of polyester microfibers present in the polyamide matrix) of the original fibrous material will increase the whiteness and impart the lustrous effect of the present invention. Weight losses above about 20 weight percent of the original fibrous material are within the teachings of the present invention but do not significantly increase the whiteness or change the degree of lustrous effect imparted, and are not preferred because of strength loss in the treated fibrous material. The above weight loss ranges of the original fibrous material preferably amount to losses of about 6 to 90 weight percent of the polyester microfibers dispersed in the polyamide matrix.

Scouring and rinsing are desirable to clear the fibrous material of any residual hydrolyzed fiber and hydrolyzing medium left over from the hot, caustic treatment. The scouring solution may contain derivatives of higher fatty acids or other customary detergents. After rinsing, the fibrous material can be dried at ordinary temperature, usually not more than 100° C.

## PREFERRED EMBODIMENTS

The following examples illustrate the practice and principles of this invention and a mode of carrying out the invention.

### EXAMPLE 1

A synthetic multifilament yarn containing 30 parts by weight of polyethylene terephthalate microfibers dispersed in 70 parts by weight of nylon 6 was wound on a perforated stainless steel sleeve. The yarn contained 20 filaments and was drawn at a draw ratio of 3.85X to a final denier of 124. The polyethylene terephthalate microfibers had an average diameter not above 1 micron and had an average length at least 20 times their average diameter. The microfibers lay predominantly in the direction of the filament axis. The sleeve containing the multifilament yarn was immersed for 30 minutes in a boiling caustic solution prepared by dissolving 140 grams of potassium hydroxide in 2,500 ml. of water. The multifilament yarn on the sleeve was rinsed with water for 15 minutes and then dried. The multifilament yarn was analyzed and was found to have a polyethylene terephthalate content of 23.1 percent. The hot caustic treatment increased the whiteness and produced a silk-like luster in the yarn

### EXAMPLE 2

A synthetic multifilament yarn containing 30 parts by weight of polyethylene terephthalate microfibers dispersed in 70 parts by weight of nylon 6 was knitted into a fabric. The yarn contained 20 filaments and was drawn at a draw ratio of 3.85X to a final denier of 120. The polyethylene terephthalate microfibers had an average diameter not above 1 micron and had an average length at least 20 times their average diameter. The microfibers lay predominantly in the direction of the filament axis. Four unscoured samples of the fabric were treated for various lengths of time in a boiling 1N (4 weight percent) sodium hydroxide solution. The weight of the caustic solution was about 40 times the weight of the fabric. The treated fabric samples were removed from the caustic solution, rinsed with warm water for 15 minutes, dried, weighed, and then analyzed for polyethylene terephthalate content. The treated fabrics had a dry and scroopy handle and a silk-like luster. The results of the caustic treatment are contained in Table 1 below:

TABLE I

| Treatment Time in Caustic Solution, min. | Fabric Weight Loss, wt. percent | Polyethylene Terephthalate Content, wt. percent |
|---|---|---|
| Control | 0 | 30 |
| 15 | 17.6 | 17.2 |
| 30 | 23.6 | 10.9 |
| 45 | 27.0 | 6.6 |
| 60 | 28.5 | 4.6 |

## EXAMPLE 3

A synthetic multifilament yarn containing 30 parts by weight of polyethylene terephthalate microfibers dispersed in 70 parts by weight of nylon 6 was knitted into a fabric. The yarn contained 70 filaments and was drawn at a draw ratio of 3.85X to a final denier of 1125. The polyethylene terephthalate microfibers had an average diameter not above 1 micron and had an average length at least 20 times their average diameter. The microfibers lay predominantly in the direction of the filament axis. Four unscoured samples of the fabric were treated for 70 minutes in sodium hydroxide solutions of various concentrations at 98° C. The weight of the caustic solution was about 40 times the weight of the fabric. The treated fabric samples were removed from the caustic solution, rinsed with warm water for 15 minutes, dried and then measured for whiteness on a Hunter Color Difference Meter. The results of the caustic treatment are contained in Table II below. The whiteness of the fabric was the determination of the lightness and blueness of the fabric in the formula:

$$\text{Whiteness} = \text{Lightness} - 3\,\text{Blueness}$$

TABLE II

| Sample | Chemical Treatment | Caustic Concentration, gm./l. | Whiteness |
|---|---|---|---|
| Control | $H_2O$ | — | 65.4 |
| 1 | NaOH | 5 | 68.1 |
| 2 | NaOH | 20 | 70.8 |
| 3 | NaOH | 60 | 72.9 |

This example shows that fabric whiteness increase with increased caustic concentration.

## EXAMPLE 4

Four unscoured samples of the fabric of Example 3 were treated for 70 minutes in sodium hydroxide solutions of various concentrations at 98° C. The weight of the caustic solution was about 40 times the weight of the fabric. The treated fabric samples were removed from the caustic solution, rinsed with warm water for 15 minutes, dried, weighed and measured for whiteness on a Hunter Color Difference Meter. The percent weight loss caused by the caustic treatment increased as the concentration of the caustic treating solution increased. The results of the caustic treatment are contained in Table III below.

TABLE III

| Sample | Chemical Treatment | Concentration gm./l. | Fabric Wt. Loss wt. percent | Whiteness |
|---|---|---|---|---|
| Control | $H_2O$ | — | 1 | 65.4 |
| 5 | NaOH | 5 | 8 | 68.1 |
| 6 | NaOH | 20 | 12 | 70.8 |
| 7 | NaOH | 40 | 17 | 71.2 |
| 8 | NaOH | 60 | 19 | 72.9 |

This example shows the fabric weight loss and whiteness increase with increased caustic concentration.

## EXAMPLE 5

The yarn of Example 3 was tufted into a carpet, scoured and then treated for 60 minutes in a boiling 1N (5.6 wt. percent) potassium hydroxide solution. The weight of the caustic solution was about 40 times the weight of the carpet. The treated carpet was removed from the caustic solution, rinsed with warm water for 15 minutes, dried, and submitted to the Accelerated Soiling Test at 10 percent relative humidity. The Accelerated Soiling Test measures the variation in reflectance before and after soiling. The results of Accelerated Soiling Tests are contained in Table IV below:

TABLE IV

| Sample | Apparent Soil, ΔK/S |
|---|---|
| Control (scoured) | 2.26 |
| Caustic treated | 1.76 |

In the Accelerated Soiling Test, carpet samples are mounted on the periphery of a drum, tumbled with felt cubes loaded with artificial soil for 30 minutes, removed from the drum, and measured for reflectance on a Hunter Color Difference Meter. The apparent soil is given by the formula:

$$K/S=(1-R)^2/2R$$

wherein

K = light absorption coefficient
S = light scattering coefficient
R = reflectance

A difference of 0.5 in apparent soil as reported in Table IV indicates a significant improvement of the treated sample over the control.

## EXAMPLE 6

A synthetic multifilament yarn containing 30 parts by weight of polyethylene terephthalate microfibers dispersed in 70 parts by weight of nylon 6 was woven into a plain weave fabric having 19 picks per inch in both the warp and fill directions. The yarn contained 136 filaments and was drawn at a draw ratio of 4.85X to a final denier of 840. The polyethylene terephthalate microfibers had an average diameter not above 1 micron and had an average length at least 20 times their average diameter. The microfibers lay predominantly in the direction of the filament axis. The fabric was bonded by fusing it on a tenter frame at 30 percent overfeed for 3 minutes at 250° C in accordance with the method described in U.S. Application Ser. No. 727,327, filed May 7, 1968. The fused fabric was then cut into 2 × 2 inch samples and the samples were separately immersed in boiling sodium hydroxide solutions containing various amounts of sodium hydroxide for various lengths of time. The weight of the caustic solution was about 40 times the weight of the fused fabric. The treated fused fabric samples were removed from the caustic solution, rinsed with warm water for 15 minutes, dried, weighed, measured for whiteness by means of the Hunter Color Difference Meter and inspected for appearance. The data contained in Table V below indicate that a weight loss of about 6 to 7 wt. percent is required for a bright lustrous appearance whereas a weight loss of about 12 to 13 wt. percent is required for a very bright lustrous appearance.

TABLE V

[Aqueous sodium hydroxide solution treatment of fused fabric]

| Fused fabric sample | Sodium hydroxide concentration, wt. percent | Time, min. | Fabric weight loss, weight percent | Whiteness | Appearance |
|---|---|---|---|---|---|
| Control | | | | 61.5 | Dull luster. |
| A | 0.5 | 5 | 0.7 | 60.9 | Unchanged. |
| B | 0.5 | 10 | 0.8 | 62.1 | Do. |
| C | 0.5 | 15 | 1.0 | 61.2 | Do. |

TABLE V — Continued

[Aqueous sodium hydroxide solution treatment of fused fabric]

| Fused fabric sample | Sodium hydroxide concentration, wt. percent | Time, min. | Fabric weight loss, weight percent | Whiteness | Appearance |
|---|---|---|---|---|---|
| D | 0.5 | 30 | 2.6 | 61.6 | Slightly bright luster. |
| E | 0.5 | 60 | 8.9 | 80.7 | Bright luster. |
| F | 1.0 | 5 | 0.9 | 64.8 | Unchanged. |
| G | 1.0 | 10 | 1.3 | 60.6 | Do. |
| H | 1.0 | 15 | 2.8 | 64.3 | Do. |
| I | 1.0 | 30 | 6.4 | 78.1 | Bright luster. |
| J | 1.0 | 60 | 14.2 | 85.0 | Very bright luster. |
| K | 2.0 | 5 | 1.9 | 62.9 | Unchanged. |
| L | 2.0 | 10 | 4.9 | 71.8 | Slightly bright luster. |
| M | 2.0 | 15 | 7.2 | 76.8 | Bright luster. |
| N | 2.0 | 30 | 13.3 | 83.4 | Very bright luster. |
| O | 2.0 | 60 | 23.4 | 84.6 | Do. |
| P | 4.0 | 5 | 4.5 | 71.9 | Slightly bright luster. |
| Q | 4.0 | 10 | 8.5 | 78.8 | Bright luster. |
| R | 4.0 | 15 | 12.9 | 81.9 | Very bright luster. |
| S | 4.0 | 30 | 23.5 | 83.3 | Do. |
| T | 4.0 | 60 | 29.2 | 82.3 | Do. |

## EXAMPLE 7

A film of 2 mil thickness and containing 30 parts by weight of polyethylene terephthalate microfibers dispersed in 70 parts by weight of nylon 6 was cut into 2 × 2 inch samples. The samples were separately immersed for 60 minutes in various boiling 1N caustic solutions containing KOH, LiOH, $Na_2SiO_3$ and $Na_2CO_3$. The weight of the caustic solution was about 40 times the weight of the film. The treated film samples were removed from the caustic solutions, rinsed with warm water for 15 minutes, treated in a 1 percent acetic acid solution for 10 minutes, rinsed again, dried and weighed. In all cases, the treated film samples were lighter and possessed a bright, lustrous appearance. The results are contained in Table VI below:

TABLE VI

| Caustic Treatment | Concentration, wt. percent | Film Weight Loss, wt. percent |
|---|---|---|
| Control ($H_2O$) | — | 1.0 |
| KOH | 5.6 (1N) | 12.5 |
| LiOH | 2.4 (1N) | 20.0 |
| $Na_2SiO_3$ | 12.2 (1N) | 13.5 |
| $Na_2CO_3$ | 10.6 (1N) | 3.6 |

## EXAMPLE 8

A synthetic 15 denier monofilament having a draw ratio of 3.65X and containing 15 parts by weight of polyethylene terephthalate microfibers dispersed in 85 parts by weight of nylon 6 was knitted into a fabric. The polyethylene terephthalate microfibers had an average diameter not above 1 micron and had an average length at least 20 times their average diameter. The microfibers lay predominantly in the direction of the filament axis. The fabric was then cut into 2 × 2 inch samples and the samples were separately immersed in boiling sodium hydroxide solutions containing various amounts of sodium hydroxide for various lengths of time. The weight of the caustic solution was about 40 times the weight of the fabric. The treated fabric samples were removed from the caustic solutions, rinsed with warm water for 15 minutes, dried, weighed and inspected for appearance. The treated fabrics had a dry and scroopy handle and a silk-like luster. The results of the caustic treatment are contained in Table VII below:

TABLE VII

| Fabric sample | Sodium hydroxide solution conc., wt. percent | Treatment time, min. | Fabric weight loss, weight percent | Appearance |
|---|---|---|---|---|
| Control | Scoured | 30 | 1 | Dull luster. |
| A | 0.5 | 15 | 2 | Unchanged. |
| B | 0.5 | 30 | 4.7 | Slightly bright luster. |
| C | 0.5 | 60 | 9.1 | Bright luster. |
| D | 2.0 | 15 | 6.8 | Slightly bright luster. |
| E | 2.0 | 30 | 11.9 | Bright luster. |
| F | 2.0 | 60 | 15.9 | Very bright luster. |
| G | 4.0 | 15 | 12.3 | Bright luster. |
| H | 4.0 | 30 | 15.1 | Very bright luster. |
| I | 4.0 | 60 | 14.7 | Do. |

What is claimed is:

1. A process for preparing a fused fabric having increased whiteness and a bright luster, which comprises:
   a. weaving into a woven fabric a synthetic multi-filament yarn containing about 30 parts by weight of polyethylene terephthalate microfibers dispersed in about 70 parts by weight of a fiber-forming polyamide matrix, said microfibers lying predominantly in the direction of the filament axis and having an average diameter less than about 1 micron and an average length at least 20 times their average diameter;
   b. fusing the woven fabric at about 250° C for about 3 minutes to bond the filaments together, whereby a fused fabric is formed having a dull luster;
   c. treating the fused fabric with a hot, aqueous alkali metal hydroxide solution containing about 2.0 to 4.0 weight percent of alkali metal hydroxide, at a temperature between about 95° C and the boiling point of the aqueous alkali metal hydroxide solution, for about 15 to 60 minutes to remove a portion of said polyethylene terephthalate microfibers between about 12 and about 20 weight percent of the original fabric material to produce elongated microvoids in the filaments thereby increasing the whiteness and imparting a bright luster to the fused fabric.

2. The process as claimed in claim 1 wherein the multi-filament yarn in step (a) contains about 30 parts by weight of polyethylene terephthalate microfibers dispersed in about 70 parts by weight of a fiber-forming polymerized e-caprolactam, and the polyethylene terephthalate removed in step (c) is about 12 to 13 weight percent of the original fabric, whereby a very bright lustrous appearance is imparted to the fused fabric.

* * * * *