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PROCESS FOR THE TREATMENT OF TEXTILE MATERIALS

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ABSTRACT OF THE DISCLOSURE

There is provided a process for the treatment of textile materials containing fibers of polyethylene terephthalate wherein the textile material is heat set and subsequently scoured by passing the textile material through a bath of a solvent selected from trichloroethylene, perchloroethylene and 1,1,2-trichloro-1,2,2 - trifluoroethane. The solvent is subsequently removed from the textile by contacting with an aqueous medium.

This invention relates to a process for the treatment of textile materials and more particularly to a process wherein there is involved a heat-setting operation.

It is well known that textile materials of a thermoplastic nature, for example, those composed entirely of synthetic materials such as "Terylene" brand of polyester fibre ("Terylene" is a registered trademark) or mixture of these materials with materials of a non-thermoplastic character such as cotton are subjected to a heat setting operation. The purpose of this operation is to confer dimensional and structural stability to the materials, to prevent cockling which can occur during pleating and making up, to improve the resistance to pilling and to avoid the development of running marks and creases during dyeing. The textile materials are desized with an enzyme solution (where required) followed by aqueous scouring to remove such contaminants as general dirt, oil and grease and stains of all kinds, are bleached (where required) and the textiles are then heat-set. This sequence is adopted since if a heat-setting operation were introduced prior to the scouring and subsequent finishing treatments the oil, grease, stains and size and other contaminants would become heat cured and held most tenaciously in the fibres of the material. It would then be most difficult, if not impossible, to remove effectively these contaminants by aqueous scouring treatments. Indeed it is difficult enough to remove said contaminants from textile materials of a thermoplastic nature by an aqueous scour even this scour has not been proceeded by a heat-set operation. Nevertheless if a heat-setting operation could be carried out as a first stage prior to a scouring treatment this would be eminently desirable since the textile material coming from the loom is already in the dry state and there would be no call as in the usual procedure to utilise heat to remove entrained water from a aqueous bath. Again a first stage heat-set operation would have the advantage of making the material more resistant to creasing in subsequent processing and also of removing any creases which exist in the fabric as woven or knitted.

We have now surprisingly found that textile materials of a thermoplastic nature or mixtures thereof with materials of non-thermoplastic nature can be heat-treated and subsequently most effectively scoured in a solvent bath of trichloroethylene, perchloroethylene, or 1:1:2-trichloro-1:2:2-trifluoroethane.

By the process of this invention the advantages accrue not only of being able to heat-set the textiles as a first step but also of removing effectively the oily and other

contaminants which are to some extent baked into the textiles and which consequently would not be removed by an aqueous scour. The first stage heat-setting of the textiles in the gray condition prevents shrinkage which could otherwise occur in the solvent treatment.

According to the present invention, therefore, there is provided a process for the treatment of textile materials selected from the group consisting of textile materials of a thermoplastic nature and mixtures thereof with materials of a non-thermoplastic character which comprises heat treating said materials and subsequently scouring the heat-set materials by passing them through a bath of solvent selected from the group consisting of trichloroethylene, perchloroethylene and 1:1:2-trichloro-1:2:2-trifluoroethane.

Thermoplastic textile materials to be used in the present invention are those which noticeably soften on application of heat. They are usually synthetic materials and include, by way of example only, polyester textile materials particularly those made of polyethylene terephthalate such as "Terylene" brand of polyester fibre ("Terylene" is a registered trademark) or co-polyesters such as "Dacron" ("Dacron" is a registered trademark). Other thermoplastic materials are polyamide materials such as nylon, and esterified cellulosic materials and acrylic materials. Mixtures of these thermoplastic textile materials may be used. Materials of a non-thermoplastic nature which are in themselves normally not heat-set include, by way of example only, cotton, viscose rayon including polynosic rayon, wool, flax, and silk. Examples of mixtures of thermoplastic and non-thermoplastic materials are mixtures of polyester textile materials made of polyethylene terephthalate with the non-thermoplastic textile materials, cotton, rayon, polynosic rayon, wool, silk and flax. The materials to be treated include not only fabrics at open width but also individual items of apparel such as stockings and non-woven goods such as felted and knitted goods.

The heat-setting operation may be effected in a conventional manner, for example by passing the materials into a zone of heated air or superheated steam whilst their dimensions are controlled or by passing over the surface of heated rollers. The particular conditions employed for heat-setting depend on the particular textile material employed. The temperature employed of course is above that to which the material is subjected in subsequent processes. With a textile material consisting wholly of "Terylene" brand of polyester fibre or a material consisting of a mixture of "Terylene" brand of polyester fibre with, for example, cotton or wool a dry heat-setting operation in the temperature range 150° C. to 220° C. for up to 45 seconds is appropriate.

In the present process the solvents finding most widespread use for the treatment of textiles in general are trichloroethylene and perchloroethylene, particularly, trichloroethylene. Preferably the solvents are employed at or near the boil and preferably the materials are passed continuously through the bath. The total immersion time required to scour the textiles with the solvent at or near the boil is usually not more than three minutes and often not more than half a minute. The solvent can be removed from the goods by contacting them with an aqueous medium. With a limited number of textile materials which are sensitive to even moderately high temperature and/or the action of trichloroethylene or perchloroethylene the solvent employed is 1:1:2-trichloroethane, the temperature of the water bath for removal of this solvent being about 45° C. to 55° C. Examples of such sensitive materials are thermoplastic textiles based on acrylonitrile polymers or copolymers and/or polyolefines. The process for treatment of such sensitive materials with said tri-

chlorotrifluoroethane is disclosed in our British provisional application No. 38,216/64. Again solvent can be removed from the non-sensitive textile materials by subjecting them to the action of steam as is described in our United States Patent No. 3,106,460. After such removal of solvent the textile materials may be given a conventional aqueous desizing and/or bleaching treatment, for example, an enzyme desizing treatment or a chlorite bleaching treatment. Again after freeing from the solvent the textile materials may be padded in an aqueous alkaline solution of a peroxygen compound of pH above 11 and an alkalinity corresponding to at least 7.2 grams per litre NaOH and then steamed as is described in our United States Patent No. 2,790,699 to promote desizing and partial bleaching. After the desizing treatment the textiles can be passed into a bleaching bath of pH 9.5 to 11 and of alkalinity less than that corresponding to 7.2 grams per litre NaOH and then steamed as is described in our United States Patent 2,803,517. The present process is eminently suitable for combination with continuous finishing processes such as continuous dyeing processes.

The following examples illustrate but do not limit the invention.

EXAMPLE 1

In order to test thoroughly the efficiency of the process a loomstate nylon fabric containing 2.83% mineral oil was submitted to a vigorous heat treatment by heating in air at 180° C. for 2 minutes. Thereafter the fabric was continuously passed through trichloroethylene maintained at its boiling point, the total time of immersion in the solvent being 30 seconds. After treatment with hot water at a temperature of 90° C. for 30 seconds to remove solvent and then drying, the fabric was found to have an oil content of only 0.21%.

Comparison

By way of comparison the above procedure was repeated without the heat-set operation. After removal of solvent by flashing off with hot water and drying, the oil content of the fabric was found to be much the same, namely, 0.23%. This showed that the heat-set which had in Example 1 preceded the trichloroethylene treatment and which might have been expected to bake the contaminants in the fabric and make them difficult to remove, were in fact effectively removed despite the heat-setting operation.

EXAMPLE 2

In order to test thoroughly the efficiency of the process a loomstate "Terylene"/cotton fabric ("Terylene" is a registered trademark), which had been treated with a starch size (size content 4.94%, was submitted to a vigorous heat treatment by heating in air at 200° C. for 45 seconds. Thereafter the fabric was scoured with boiling trichloroethylene and treated with hot water and dried in the manner indicated in Example 1. The dried fabric was found to have a size content of 1.54%.

Comparison

By way of comparison the procedure of Example 2 was repeated without the heat-set operation and the size content of the treated fabric was much the same, namely, 1.54%. Similar comments apply as indicated in the Comparison following Example 1.

What we claim is:

1. A process for the treatment of textile materials selected from the group consisting of fibers of a polyethylene terephthalate and mixtures thereof with fibers of a non-thermoplastic character which comprises in sequence dry heat setting said fibers at 150° to 220° C., scouring the heat set fibers by passing them through a bath at or near the boiling point consisting essentially of at least one halogenated organic solvent selected from the group consisting of trichloroethylene, perchloroethylene and 1,1,2-trichloro-1,2,2-trifluoroethane and removing the solvent from the fibers emerging from the bath by contacting them with water, in the form of a liquid aqueous medium held at an elevated temperature, or with water, in the form of steam.

2. In a process for scouring and heat setting a polyethylene terephthalate fiber containing textiles, the improvement comprising scouring the said textile subsequent to dry heat setting at 150° to 220° C. by passing the said textile through a bath at or near the boiling point of scouring medium consisting essentially of a solvent selected from the group consisting of trichloroethylene, perchloroethylene and 1,1,2-trichloro-1,2,2-trifluoroethane and removing said solvent from the textile by contacting the textile with an aqueous medium.

3. The process of claim 2 wherein the aqueous medium is in the vapor state.

4. The process of claim 2 wherein the aqueous medium is in the liquid state.

5. The process of claim 2 wherein the solvent is trichloroethylene.

6. A process as claimed in claim 1 in which the said textile also contains fibers selected from the group consisting of cotton, viscose rayon, wool, silk and flax.

7. A process as claimed in claim 1 in which the solvent employed is trichloroethylene.

8. A process as claimed in claim 1 in which the goods after removal of solvent are submitted to an aqueous desizing treatment.

9. A process as claimed in claim 1 in which the textile materials after removal of solvent are submitted to an aqueous desizing and part bleaching treatment which comprises padding the materials in a bath containing an aqueous alkaline solution of a peroxygen compound of pH above 11 and an alkalinity corresponding to at least 7.2 grams per litre NaOH and then steaming the materials.

10. A process as claimed in claim 1 in which the textile materials after the desizing treatment are bleached by padding them in a bath of an aqueous alkaline solution of a peroxygen compound of pH less than 11 and an alkalinity less than that corresponding to 7.2 grams per litre NaOH and are then steamed.

11. A process as claimed in claim 1 in which the goods after removal of solvent are submitted to a bleaching treatment.

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