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PROCESS FOR CLEANING TEXTILE MATERIALS

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8 Claims. (Cl. 8—137)

ABSTRACT OF THE DISCLOSURE

There is provided a process for cleaning textile materials of dirt and greasy substances wherein the textile is scoured with trichloro-trifluoroethane and subsequently contacted with hot water wherby any remaining trichloro-trifluoroethane is vaporized from the textile.

This invention relates to a process for cleaning and degreasing synthetic materials which are sensitive to heat and solvents.

It is known to clean and degrease various textile materials by treatment with organic solvents, particularly chlorinated hydrocarbons. When the materials have been so cleaned, it is usual to remove the dirty solvent, replace it by fresh solvent to rinse away the grease and dirt, and after this, to dry the solvent-wet material by evaporating the residual solvent. This is the conventional "dry-cleaning" procedure. This technique is relatively time-consuming even with up-to-date equipment and so is not really suitable for treatment of large amounts of material by a continuous process, as for example the treatment of fabrics or yarns in continuous length. The principal delay is in the final removal of the solvent, and a technique which deals with this satisfactorily is to pass the solvent-laden textile material into a hot water bath which is at such a temperature as to cause rapid evaporation of the solvent. In the case of cloth made from vegetable fibres, such a process is described in U.K. specification No. 812,894.

With the conventional organic cleaning solvents, particularly trichloroethylene and perchloroethylene, it is usually found that the temperature of the hot water bath needs to be kept at 80° C. or more and often at nearly 100° C. in order to maintain rapid removal of the solvent. Indeed, it is useful to contact the solvent-laden textile material with steam in order to evaporate the solvent. While this is quite satisfactory for most natural textile materials and for many synthetic ones, there are some textile materials (notably polymers and copolymers of acrylonitrile) which are sensitive to high temperatures and so cannot be freed from these conventional solvents at a satisfactory rate when using the temperatures which are low enough to cause no damage to the textile material. Some textile materials, (notably cellulose tri-acetate) and polyolefines (e.g. polyethylene and polypropylene) are also very sensitive to the hot trichloroethylene or perchloroethylene itself and tend to be deformed or damaged by it.

We have now found that the process of solvent treatment followed by removal of the solvent from the textile material by a hot water bath can be carried out very satisfactorily by using trichlorotrifluoroethane as the organic solvent. In this way rapid removal of solvent can be secured using a low water-bath temperature at which damage due to hot water or hot solvent can be avoided.

Thus according to our invention we provide an improved process for the cleaning and degreasing of textile materials which comprises immersing the textile material in trichlorofluoroethane, removing surplus solvent from the textile material and then passing it into an aqueous bath maintained at such a temperature as produces rapid evaporation of the solvent.

This process is especially valuable for treatment of textile materials composed of or containing materials which are sensitive to (that is, adversely affected by) the conventional solvents (particularly trichloroethylene or perchloroethylene) or to the temperatures usually required to evaporate these solvents at a satisfactory rate, for example polymers and copolymers of acrylonitrile, cellulose triesters (e.g. cellulose tri-acetate), polymers and copolymers of olefines (particularly polypropylene), or mixtures thereof. The process may also be applied to other textile materials, even if they are not adversely affected by the conventional solvents; in particular mixtures of sensitive and non-sensitive textile materials may be treated without harm. Although there may be little or no apparent advantage in using the present process for treating textile materials which are entirely insensitive to conventional solvents, it is nevertheless an advantage to an operator that any process can be used for the treatment of practically any textile material without the need to modify any of the baths used. This is especially useful for treatment of textiles which may be of uncertain constitution or when risk of damage must be kept to an absolute minimum. Dyed materials can also be treated.

The textile materials are most conveniently in continuous length, particularly of woven cloth, but can be employed in any form which can be transported satisfactorily through the plant.

The temperature required for the water-bath is usually above 45° C., but need not be above 55° C. By using a temperature in this range, rapid removal of the solvent can be secured without reaching a temperature at which the textile material is likely to suffer damage.

The bath of trichlorofluoroethane may be maintained at any temperature up to its boiling point without affecting the textile materials, but at a temperature in the range of 40° C. to 50° C. is usually sufficient to remove most oil or greasy contaminants fairly rapidly. The treatment time in the solvent bath may be as little as 10 seconds in some instances, though 10–60 seconds is usually required; longer treatment times may be used if desired, for example when the contamination on the textile material is tenaciously held.

The trichlorotrifluoroethane used may be in particular 1:1:2 - trichloro-1:2:2-trifluoroethane, though 1:1:1-trichloro-2:2:2-trifluoroethane or mixtures of the two isomers may also be used if desired.

Apart from the choice of solvent, and the lower treatment temperatures which we find are practicable in consequence, the procedure is substantially that described in U.K. specification No. 812,894. It is very unexpected that the relatively simple modification of selecting trichlorotrifluoroethane as solvent enables the process to be extended usefully to the treatment of textile materials which formerly could not be so treated because of the risk of damage under the processing conditions previously thought to be necessary.

The invention is illustrated but not limited by the following example in which the parts and percentages are by weight.

Example

A loomstate fabric composed of fibres made of an acrylonitrile copolymer woven on to a base made of polypropylene filaments was fed continuously, in open width, into a bath of 1:1:2-trichloro-1:2:2-trifluoroethane at such a rate that the treatment time was 30 seconds. The bath was maintained at 48° C., the boiling point of the trichlorotrifluoroethane.

The fabric emerging from this bath was then passed between rollers to remove surplus solvent and then passed into a bath of hot water maintained at 50° C., the time of immersion being 30 seconds. On leaving this aqueous bath the bath was found to be free from organic solvent and oily or greasy contamination, and showing no signs of damage or distortion of either the polyacrylonitrile or polypropylene components.

Repetition of this procedure for purposes of comparison, using trichloroethylene as solvent, caused the polypropylene backing to be distorted and shrunken, and thus converted to a hard and useless material. Treatment with water at 90° C. also causes some modification of acrylonitrile copolymer fibres.

What I claim is:

1. Process for the cleaning and degreasing of textile materials which are sensitive to heat and solvents which comprises immersing the textile material in trichlorotrifluoroethane, removing surplus solvent from the textile material, and then passing it into an aqueous bath maintained at such a temperature as produces rapid evaporation of the trichloro-trifluoroethane.

2. Process as defined in claim 1 wherein 1:1:2-trichloro-1:2:2-trifluoroethane is employed.

3. Process as defined in claim 1 wherein the textile material is immersed in a bath of trichloro-trifluoroethane which is maintained at a temperature in the range 40° C. to 50° C.

4. Process as defined in claim 1 wherein the textile material is immersed in the trichloro-trifluoroethane for a period in the range 10–60 seconds.

5. Process as defined in claim 1 wherein the aqueous bath is at a temperature not exceeding 55° C.

6. Process as defined in claim 5 wherein the aqueous bath is at a temperature in the range 45° C. to 55° C.

7. The process as defined in claim 1 wherein the textile material treated is selected from the group consisting of a polymer or copolymer of acrylonitrile, a polymer or copolymer of an olefin and a cellulose triester.

8. The process as defined in claim 7 wherein the said textile material is selected from the group consisting of polypropylene and cellulose triacetate.

References Cited

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