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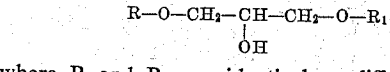
3,342,542

DYEING AND PRINTING OF POLYESTER AND TRIACETATE FIBERS WITH A GLYCEROL DI ARYLETHER CARRIER

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Claims priority, application Switzerland, Nov. 25, 1964, 15,244/64
6 Claims. (Cl. 8—55)

The present invention provides a process for coloring, i.e. dyeing or printing textile materials from polyester and/or triacetate fibers with dyestuffs that are sparingly soluble to insoluble in water and in the presence of a carrier, wherein at least one compound of the formula



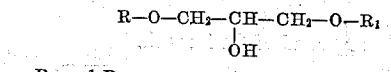
—where R and R_1 are identical or different aryl radicals—is added as carrier to the coloring preparation.

The textile materials to be dyed by the present process consist of polyester fibers and/or triacetate fibers. Polyester fibers are primarily fibers from high-melting linear polyethylenegylcol terephthalate. The term triacetate describes products such as are obtained above all by acetylating cellulose with acetic anhydride and sulfuric acid in methylenechloride as solvent in spinning.

Both types of fibers, or mixtures of these two types of fibers, are dyed or printed with developing dyestuffs or their components or with vat dyes or in the first place with disperse dyestuffs. The term disperse dyestuffs describes organic colored compounds of which at most only traces are water-soluble and which must therefore be applied in the form of aqueous dispersions; they may belong to a wide variety of types of dyestuffs and belong preferably to the azo and aminoanthaquinone dyestuffs.

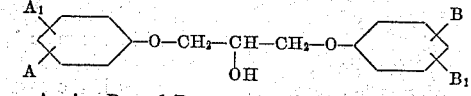
To ensure that the aforementioned aqueous dispersion yield satisfactory results on the hydrophobic synthetic fibrous material even under unfavourable conditions, so-called carriers are incorporated with the dyeing preparations to be used. A carrier is an aliphatic, aromatic or aliphatic-aromatic compound which is soluble or insoluble in water and is capable of swelling when acted upon by the fibrous material, whereby the penetration of the dyestuff into the fibre is facilitated.

It has now been found that diethers of glycerol corresponding to the formula

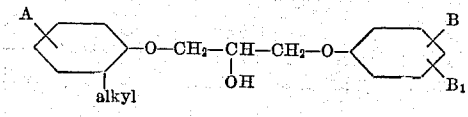
(1) 

where R and R_1 represent identical or different aryl radicals—are particularly suitable carriers.

From among the compounds of the formula (1) those are especially suitable which correspond to the formula

(2) 

where A, A_1, B and B_1 may be identical or different and each represents hydrogen, halogen or alkyl. These alkyl radicals contain with advantage 1 to 12 carbon atoms. Of special value are those compounds in which the alkyl radicals contain 1 to 8 carbon atoms and at least one alkyl radical is in ortho-position relatively to the ether bridge. A compound of this definition corresponds to the formula

(3) 

where A, B and B_1 have the above meanings and the alkyl radical contains 1 to 8 carbon atoms. However, owing to their ready accessibility the symmetrical compounds occupy a favoured position and from among these there may be specially mentioned those compounds which are substituted exclusively by alkyl radicals. It may also be emphasized that the number of substituents that may be present in each benzene ring is not limited to two and may be three or more.

The afore-mentioned glycerol diethers are as such known and are obtained by known methods. Thus, for example, they are obtained in good yields by reacting a suitable phenol with epichlorohydrin in an alkaline medium. Suitable phenols are inter alia phenol itself, ortho-cresol, para-cresol, ortho-ethyl phenol, the different xylenols, ortho-chlorophenol, ortho-isopropylphenol, 2,6-diisopropyl-phenol, ortho-tertiary butylphenol, 4-chloro-2-isopropyl-5-methyl-benzene, para-tertiary octylphenol and the like.

The proportion of carrier to be used may vary within wide limits and ranges from 0.1 to 100 parts per 1000 parts of the dyeing preparation. The amount of carrier must be adapted to the individual method of application used, that is to say it will vary for printing and for dyeing. As a rule best results are achieved with amounts ranging from 0.5 to 40 parts per 1000 parts of coloring preparation. Both in roller printing and screen printing the addition of a conventional thickener is needed. Any usual thickener is suitable, for example alginates, British gum, tragacanth, starches, cellulose and carboxycellulose derivatives, locust bean flour preparations and emulsion thickenings.

It is advantageous to apply the dyeing preparations by printing, which requires an intermediate drying of the printed fabric. After the intermediate drying the fabric is subjected to heat-setting, which may be carried out in dry or moist conditions. The dry setting operation is a heat treatment with hot air at a temperature within the range from 130 to 200° C., preferably from 140 to 160° C., for ½ to 5 minutes. The wet treatment consists in steaming at 100 to 140° C., preferably at 110 to 120° C., for 15 to 50 minutes and is carried out in any one of the apparatus conventionally used for steaming at these temperatures.

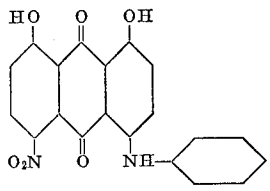
Apart from the carrier and the thickener the printing paste may contain the usual additives, such as antifoaming agents, for example fats, oils, mineral oils, oil of turpentine, silicones or water-insoluble metal soaps. Hydrotropic agents, above all urea or thiourea, may likewise be added. To protect the dyestuffs from possible reductive damage, for example by the action of the fibre, it has been found advantageous to add a mild oxidant, for example sodium meta-nitrobenzenesulphonate. In this connection it should also be mentioned that the dyeing preparation may contain either one or several carriers. Thus, in addition to one or several compounds required according to this invention the preparation may contain known carriers. As such carriers there are often used derivatives of benzene or of phenol, for example phenol, ortho- or para-phenylphenol, chlorinated benzenes, xylenes, benzyl alcohol, aromatic esters or ethers, or benzoic or salicylic acid. It is only necessary for at least one of the carriers used to satisfy the requirements of this invention, while the others may be freely selected.

The advantages of the present process are above all the increase dyestuff exhaustion which, under optimum heat setting conditions, is superior to that with the known processes and at lower temperatures is still acceptable, whereas the known processes do not satisfy under these conditions. Another advantage is the low steam volatility of the carriers used, which ensures enhanced operational safety.

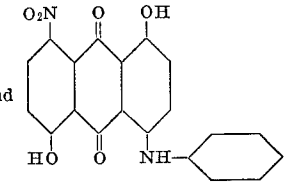
Parts and percentages in the following examples are by weight.

Example 1

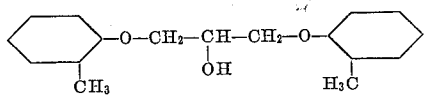
A fabric from triacetate fibres is printed with a printing paste prepared from: 30 parts of a mixture of the dyestuffs of the formulae



and



500 parts of an aqueous thickening of 15% strength from commercial, modified locust bean flour, 30 parts of the compound of the formula

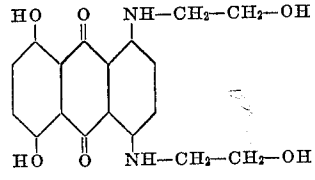


and 440 parts of water.

The printed fabric is dried at about 80° C. and then steamed for 15 minutes in a pressure steamer under a pressure of 1.75 atmospheres (gauge) at 110° C. The fabric is then finished off by rinsing in cold water, washing in a bath heated at 50° C. which contains per 1000 parts of water 2 parts of any desired, mild synthetic detergent and 1 part of sodium carbonate, and another cold rinse. The blue print is distinctly stronger than when a printing paste is used that does not contain the glycerol di-ortho-tolyl ether.

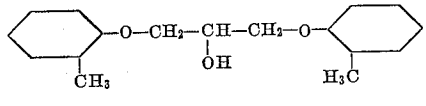
Example 2

A fabric from triacetate fibres is printed with a printing paste prepared from:
30 parts of the dyestuff of the formula



420 parts of water
10 parts of sodium meta-nitrobenzenesulphonate
500 parts of an aqueous thickening of 15% strength from commercial, modified locust bean flour
10 parts of an emulsion from:
- 60% pine oil
- 30% oleic acid
- 6.6% potassium hydroxide
- 3.4% water

30 parts of the compound of the formula



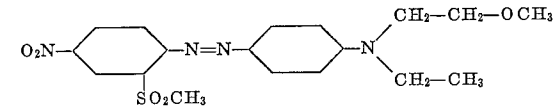
The printed fabric is treated and finished off as described in Example 1. The blue print is distinctly stronger than when the printing paste does not contain the glycerol di-ortho-tolyl ether.

When instead of glycerol di-ortho-tolyl ether the glycerol diether of a commercial xylenol mixture is used, similar results are obtained.

The same printing paste can be used to print a fabric from polyethyleneglycol terephthalate with equal results; the steaming process is replaced by a treatment with dry heat at 200° C. for one minute.

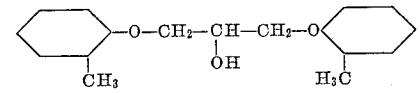
Example 3

A fabric from triacetate fibres is printed with a printing paste prepared from:
25 parts of the dyestuff of the formula



425 parts of water
10 parts of sodium meta-nitrobenzenesulphonate
500 parts of an aqueous thickening of 15% strength from commercial, modified locust bean flour
10 parts of an emulsion from:
- 60% pine oil
- 30% oleic acid
- 6.6% potassium hydroxide
- 3.4% water

30 parts of the compound of the formula

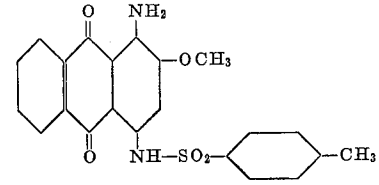


The printed fabric is dried at about 80° C. and then steamed for 15 minutes at 120° C. in a conventional steamer, and finished off as described in Example 1. The resulting strong red-violet print displays a higher degree of dyestuff fixation than when the carrier is omitted.

Similar results are obtained when the steaming process is replaced by a treatment with hot air at 150° C. for 5 minutes or at 200° C. for one minute.

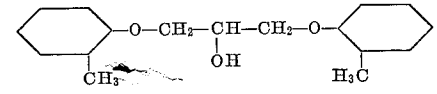
Example 4

A fabric from polyethyleneglycol terephthalate is printed with a printing paste prepared from:
30 parts of the dyestuff of the formula



420 parts of water
10 parts of sodium meta-nitrobenzenesulfonate
500 parts of an aqueous thickening of 15% strength from commercial, modified locust bean flour
10 parts of an emulsion from:
- 60% pine oil
- 30% oleic acid
- 6.6% potassium hydroxide
- 3.4% water,

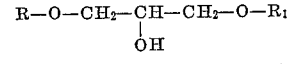
30 parts of the compound of the formula



The printed fabric is dried at about 80° C. and then subjected to a dry heat treatment for 1 minute at 180° C., and the print is finished off as described in Example 1. The resulting pink print displays a satisfactory degree of dyestuff fixation, whereas it is unsatisfactory if the carrier is omitted.

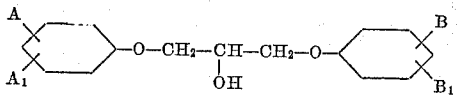
What is claimed is:

1. Process for coloring textile materials from fibers selected from the group consisting of polyester and triacetate fibers with at the most sparingly water-soluble dyestuffs, which process comprises using coloring preparations containing at least one carrier of the formula



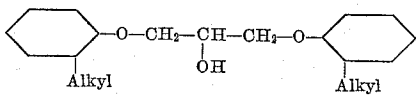
wherein R and R_1 stand for radicals selected from the group consisting of identical and different aryl radicals.

2. Process for coloring textile materials according to claim 1, which comprises using coloring preparations containing at least one carrier of the formula



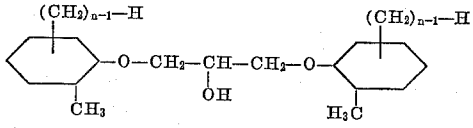
wherein A, A_1, B and B_1 are selected from the group consisting of identical and different radicals selected from the group consisting of hydrogen, halogen and alkyl.

3. Process for coloring textile materials according to claim 1, which comprises using coloring preparations containing at least one carrier of the formula



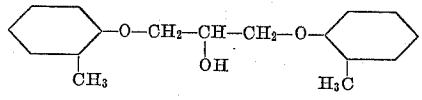
wherein the alkyl radical contains 1 to 8 carbon atoms.

4. Process for coloring textile materials according to claim 1, which comprises using coloring preparations containing at least one carrier of the formula



wherein *n* represents a whole number of at the most 2.

5. Process for coloring textile materials according to claim 1, which comprises using coloring preparations containing the carrier of the formula



6. Process for coloring continuously textile materials from triacetate fibers according to claim 1, which process comprises using coloring preparations containing as carrier glycerol diether from epichlorohydrin and a commercial mixture of xylenols.

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DONALD LEVY, *Primary Examiner.*