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PROCESS OF DYEING MIXED FIBROUS MATERIAL

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4 Claims. (Cl. 8—21)

The present invention relates to a process of dyeing and to the materials thus obtained.

It is possible to produce dyeings on structures from synthetic polyamides of high molecular weight, for instance threads, yarns and fabrics, by dyeing these bodies with dyestuffs as used for dyeing wool and silk.

Synthetic polyamides of high molecular weight, which may also be designated as linear polyamides or linear superpolyamides are obtainable, for instance, by heating mono-aminoalkylcarboxylic acids or diamines together with dibasic carboxylic acids or with the amide-forming derivatives of said carboxylic acids. Compounds of this kind and the structures obtainable therefrom are described in U. S. Patents Nos. 2,071,253; 2,130,523; 2,130,948 and 2,158,064; furthermore in British Patents Nos. 461,236, 461,237 and 474,999 and in French Patents Nos. 790,521; 824,548 and 827,798. Polyamides may further be obtained by causing diisocyanates to react with compounds containing in the molecule at least 2 hydrogen atoms capable of being exchanged (U. S. Patent application Serial No. 239,456, filed November 8, 1938). By polymerization of monomeric lactams containing more than six members in the ring, according to the process described in U. S. Patent No. 2,241,321 there are likewise obtained products which may be dyed according to the present process. Similar products are obtained by heating according to the process of U. S. patent application Serial No. 277,948, filed June 7, 1939, urethane compounds either per se or together with other compounds capable of being condensed with urethane compounds.

Experiences have shown that polyamide compounds in most cases possess an extraordinarily high affinity for the acid dyestuffs used in the dyeing of wool and silk, so that it is impossible to dye mixtures of polyamide compounds and fibers of animal origin or animalized fibers tone-in-tone in the manner usual for dyeing wool. The polyamide silk absorbs a very considerable portion of the dyestuff contained in the acid dye bath, the wool thereby remaining light, whereas the polyamide silk is intensely colored. Similar results are obtained on dyeing mixed yarns from polyamide silk and real silk.

Now, we have found that it is possible to dye mixtures of polyamide compounds and other fibrous materials, particularly fibrous materials of animal origin or animalized cellulose fibers, even tints by adding to the dye-baths, which contain acid wool dyestuffs, water soluble organic acids or salts having affinity for the fibrous materials. Thereby, the absorption of the dyestuffs by the polyamide compounds is retarded in favour of the other fibrous materials. The additional agents may partly also be used in neutral baths.

As acids having affinity for the fibrous material there are to be understood products which are absorbed by the material, that is to say by the polyamide fiber and the wool, the weight of the fibrous material thereby increasing. It has, for instance, been found that the dry weight of 100 gr. of wool increases by 8.35 per cent or 16.35 per cent, respectively, when the wool is treated for one hour, at boiling temperature, with 20 grams of sulfo-palmitic acid or fatty alcohol sulfate, in an aqueous bath, with addition of 4 per cent of sulfuric acid. In contradistinction to such agents having affinity for the fibrous materials products are known having affinity for the dyestuff, for instance polyglycol ethers of hydroxyl compounds of high molecular weight, which products, under the above-named conditions of testing, cause no remarkable increase in weight of the wool treated. Details as to agents having affinity for the fibrous materials and agents having affinity for the dyestuff are found in "Monatshefte für Seide, Kunstseide, Zellwolle," vol. 43 (1938), pp. 369–378. The products used have affinity for the fibrous material but have no affinity for the dyestuffs.

As organic acids having affinity for the fibrous material there may be named, for instance: aromatic sulfonic-, carboxylic or sulfocarboxylic acids, for instance salicylic acid, phthalic acid, benzylsulfanilic acids, naphthalene sulfonic acids such as alpha-naphthalene sulfonic acid, benzylnaphthalene sulfonic acids, naphthol sulfonic acids such as 2.6-naphtholsulfonic acid, anthracenesulfonic acids such as anthracene-2-sulfonic acid, sulfonic acids which are obtained by the sulfonation of phenol and the condensation of the resulting product with chlorobenzyl chloride, and condensation products from beta-naphthalene sulfonic acid and formaldehyde, condensation products from carboxylic acids of high molecular weight and hydroxysulfonic acids or aminosulfonic acids and aminocarboxylic acids, for instance oleylmethyltauride, oleylsarcoside, oleic acid ester of the hydroxyethane sulfonic acid, methyltauride of the triisobutylphenylacetic acid, the sulfonation product of oleic acid diisobutylamide, and the sulfuric acid esters of higher alcohols such as oleylalcohol sulfate, dodecylalcohol sulfate or commercial mixtures containing alcohol sulfates. The said acids having affinity for the fibrous material are suit-

ably added directly to the dye bath. Alternatively, the fibrous materials may be treated with the acids before they are dyed. As acid wool dyestuffs there may be used all dyestuffs usually applied for dyeing wool, for instance acid azo-dyestuffs inclusive of their metal complex compounds, acid triphenylmethane dyestuffs, acid anthraquinone dyestuffs, acid indole-, azine-, quinoline-, nitro- and xanthone dyestuffs and the like.

The following examples serve to illustrate the invention, but they are not intended to limit it thereto; the parts are by weight:

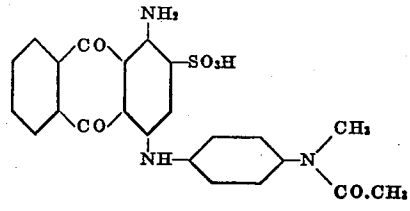
(1) A mixture of 50 parts of wool and 50 parts of threads from synthetic polyamide compounds of high molecular weight, the latter having been prepared by polymerizing lactam of the amino caproic acid according to the process of U. S. Patent No. 2,241,321, is dyed for one hour, while slightly boiling, with addition of 2 per cent of the azo-dyestuff

acetyl-para-phenylene-diamine sulfonic acid → (in an acid medium) 2-amido-8-naphthol-6-sulfonic acid

10 per cent of calcined Glauber's salt, 4 per cent of sulfuric acid of 66° Bé. and 3 per cent of the sodium salt of oleylmethyl-aminoethanesulfonic acid, in a proportion of the goods to the liquor of 1:50. The material is dyed red tints, even shades being obtained on both fibers.

A similar effect is attained by adding instead of the sodium salt of the oleyl-methyl-aminoethanesulfonic acid, the oleic acid ester of the hydroxyethane sulfonic acid.

(2) A mixed fabric consisting of equal parts of wool and polyamide silk is dyed for one hour, while slightly boiling, with addition of 2 per cent of the dyestuff



and 10 per cent of calcined Glauber's salt, 4 per cent of sulfuric acid of 66° Bé. and 10 per cent of the sodium salt of salicylic acid, the proportion of the goods to the liquor being 1:50. An even blue dyeing is obtained on both fibers.

A similar result is obtained by adding, instead of the sodium salt of salicylic acid, the condensation product from beta-naphthalenesulfonic acid and formaldehyde or the sodium salt of benzylsulfanilic acid or of the triisobutylphenylacetylmethyl-aminoethanesulfonic acid.

(3) A mixed yarn consisting of equal parts of wool and polyamide silk is dyed for one hour, while slightly boiling, with addition of 2 per cent of the dyestuff No. 974 (Schultz "Farbstofftabellen," 7th edition, 1931), 10 per cent of calcined Glauber's salt, 5 per cent of acetic acid of 30 per cent strength and 10 per cent of the sodium salt of benzylnaphthalenesulfonic acid and subsequent addition of 2 per cent of sulfuric acid of 66° Bé., the proportion of the goods to the liquor being 1:50. The material is dyed even dark-blue tints.

A similar effect is attained by adding, instead of the sodium salt of benzylnaphthalenesulfonic acid, the sodium salt of dibutylnaphthalenesulfonic acid or benzylsulfanilic acid, or the condensation product from sulfonated phenol and chlorobenzyl chloride.

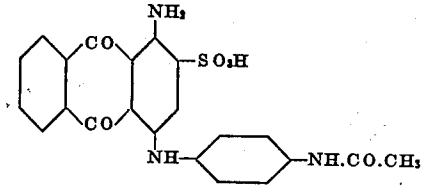
(4) Mixed fibers of equal parts of wool and polyamide silk are dyed for 1½ hours, while slightly boiling, with addition of 2 per cent of the azo-dyestuff obtainable by coupling diazotized ethyl-para-amidobenzoyl-1-naphthylamine with benzoyl-1-amino-8-naphthol-4.6-disulfonic acid, 10 per cent of calcined Glauber's salt, 6 per cent of ammonium acetate and 5 per cent of the oleic ester of hydroxyethanesulfonic acid and subsequent addition of 2 per cent of acetic acid, the proportion of the goods to the liquor being 1:50. The material is dyed even red tints.

(5) A mixture of 50 parts of wool and 50 parts of threads from synthetic polyamide compounds of high molecular weight is dyed for 1½ hours while adding 3 per cent of the complex chromium compound of the azo-dyestuff from diazotized 1.2.4-amidonaphtholsulfonic acid and 1.8-naphtholsulfonic acid, 10 per cent of sulfuric acid of 66° Bé. and 10 per cent of dodecylalcohol sulfate, the proportion of the goods to the liquor being 1:50. The material is dyed even greenish-blue tints.

(6) A mixture of equal parts of unloaded silk yarn and threads from synthetic polyamide compounds of high molecular weight is dyed for one hour, at 90° C., in a bath of boiled-off liquor acidified by means of 10 per cent of acetic acid, while adding 3 per cent of the dyestuff No. 1199 (Schultz, "Farbstofftabellen," 7th edition, 1931) and 10 per cent of the condensation product from sulfonated phenol and chlorobenzyl chloride, the proportion of the goods to the liquor being 1:50. An even blue dyeing is obtained.

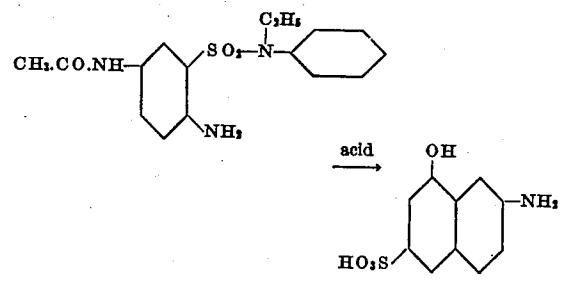
Instead of the above-named condensation product, the sodium salt of benzylnaphthalenesulfonic acid may be used with the same success.

(7) A mixture of 50 parts of casein fiber and 50 parts of fibers from synthetic polyamide compounds of high molecular weight is dyed for one hour, at 80° C., with 2 per cent of the dyestuff



while adding 5 per cent of acetic acid of 30 per cent strength and 10 per cent of the condensation product obtainable by sulfonating phenol and condensing the resulting product with chlorobenzyl chloride, the proportion of the goods to the liquor being 1:50. The material is dyed even blue tints.

(8) A mixed yarn consisting of equal parts of casein fiber and polyamide silk is dyed for one hour, at 80° C., while adding 2 per cent of the azo-dyestuff



and 5 per cent of acetic acid of 30 per cent

strength and 10 per cent of the sodium salt of benzylnaphthalenesulfonic acid, the proportion of the goods to the liquor being 1:50. The material is dyed even bordeaux-red tints.

In order to protect the casein fiber it is advantageous to add a small quantity of formaldehyde to the dyeing bath; in this case the temperature of the dyeing bath may be raised.

We claim:

1. In the process of dyeing mixtures of fibrous materials prepared from synthetic polyamides of the linear type and of high-molecular weight and of amino group-containing fibrous materials with acid wool dyestuffs, the step which comprises applying the dyestuff to the said mixture in the presence of water-soluble organic acids having affinity for the fibrous materials and being selected from the class consisting of aromatic sulfonic acids, aromatic carboxylic acids and aromatic sulphocarboxylic acids.

2. The process as defined in claim 1 wherein the water-soluble organic acid is oleyl methylamino ethane sulfonic acid.

3. The process as defined in claim 1 in which the organic acid is salicylic acid.

4. The process as defined in claim 1 in which the organic acid is benzyl naphthalene sulfonic acid.

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