

UNITED STATES PATENT OFFICE

2,234,889

DYEING OF CELLULOSIC TEXTILE MATERIALS

John Boulton and Thomas Henry Morton, Brain-tree, England, assignors to Courtaulds Limited, London, England, a British company

No Drawing. Application April 18, 1940, Serial No. 330,424. In Great Britain April 4, 1939

2 Claims. (Cl. 8—116)

This invention relates to the treatment of cellulosic textile materials in order to render them capable of being dyed with those dyestuffs usually used for dyeing wool and the like animal fibres.

It is well known that it is not ordinarily possible to dye cellulosic textile materials such as cotton, rayon, linen or the like with such dyestuffs, but that if the materials are pretreated with various substances they acquire an affinity for the said dyestuffs. For example, it has been proposed to dye cellulosic materials with wool dyes after treatment with nitrogenous materials such as amines, amides or ammonium compounds. It has also been proposed to treat the said materials with the condensation products of such nitrogenous compounds with formaldehyde including the intermediate compounds obtained from these nitrogenous compounds and formaldehyde, for example by the admixture of their solutions under suitable conditions.

According to the present invention the process of improving the dyeing properties of cellulosic materials comprises treating them with formaldehyde to obtain a cellulose product containing chemically combined formaldehyde, treating the resulting product with a nitrogenous compound of the kinds hereinafter described and thereafter heating the said product.

The cellulosic materials may be natural or artificially obtained, for example of cotton or regenerated cellulose respectively.

The said materials may be treated with formaldehyde solution by the well known process for the production of a strengthened or sthenosed product as described for example in United States Patent No. 995,852 of Eschaler, using an acid catalyst and dehydrating, or by the process described in British specification No. 510,199, wherein a small proportion of urea or thiourea is included in the formaldehyde solution. Alternatively, the cellulosic materials may be treated with an aqueous solution of formaldehyde containing a small proportion of an acid catalyst under such conditions that the reaction approaches its equilibrium whereby a cellulose-formaldehyde compound is obtained with properties different from those of that obtained according to the aforementioned processes.

The nitrogenous compounds with which the resulting product may be treated are amines, amides or ammonium compounds such, for example, as ethanolamine derivatives, cyanamide and pyridinium compounds. The treatment with the nitrogenous compound may take place in the

presence of a catalyst which promotes the reaction. The solution containing the nitrogenous compound may also contain formaldehyde which may be partially condensed with the nitrogenous compound or a further treatment with formaldehyde and/or other substances may be given, either in the dyebath or subsequently to dyeing.

The cellulosic material treated according to the present invention acquires a good affinity for those dyestuffs usually used for dyeing wool and the like animal fibres, and dyed material can be obtained in which the dye is faster to boiling in acid solution or to washing, than in the case of dyed material which has been pretreated with a solution containing formaldehyde and a nitrogenous compound.

The following example illustrates one manner of performing the present invention although the invention is not restricted to the said example:

Example

A fabric made from regenerated cellulose staple fibre is wet out with a solution of the following composition:

Formaldehyde (from 35 to 40 per cent)	25
-----cubic centimetres--	450
Thiourea -----grams--	45
Potassium tetroxalate-----do-----	16
Water-----cubic centimetres--	1,950

The fabric is then removed from the solution and squeezed or hydro-extracted until it contains from 90 to 110 per cent of its own weight of the liquor. The fabric is then either dried below 100° centigrade for a short time and then heated for from 5 to 20 minutes at from 140° to 150° centigrade, or run directly into a hot air chamber at from 140° to 150° centigrade, emerging after from 5 to 20 minutes drying. The fabric is then washed in soap solution to remove traces of acid. The so-treated material is then treated at the boil for a few seconds with a 4 per cent solution of cyanamide at pH 5. This solution is prepared by extracting 200 grams of calcium cyanamide with 750 cubic centimetres of distilled water at from 60° to 70° centigrade, acidifying the resulting solution with sulphuric acid to pH 5 and filtering off the precipitated calcium sulphate. The treated fabric is then dried and heated for from 2 to 5 minutes at from 135° to 140° centigrade and dyed in 40 volumes of 0.025 per cent solution of Kition Red (Colour Index No. 54) containing 5 per cent of formic acid, calculated on the weight of the fabric. A good red colour is obtained which is substantially

fast to washing for 20 minutes at 45° centigrade in a 0.5 per cent soap solution, such as a solution of the product sold under the registered trademark "Lux."

- 5 In the above example the formaldehyde treatment is that described in the British specification No. 510,199. It may be replaced by treatment with formaldehyde and an acid catalyst under dehydrating conditions as described in 10 United States Patent No. 995,852 of Eschaler, or by treatment with an aqueous solution containing 40 per cent of formaldehyde and sufficient sulphuric acid to give a "normal" solution for 10 minutes at 80° centigrade under which conditions the reaction between the cellulose and formaldehyde is substantially complete. 15

What we claim is:

1. Process of improving the dyeing properties of cellulosic textile material which comprises 20 treating it with formaldehyde to obtain a cellu-

lose product containing chemically combined formaldehyde, treating the resulting product with cyanamide, drying the material and thereafter heating it to a temperature of from 135° to 140° C.

2. Process of improving the dyeing properties of cellulosic textile material which comprises treating it with an aqueous solution of formaldehyde, an acid catalyst and a small proportion of a urea selected from the group consisting of urea and thiourea under such conditions that the reaction approaches its equilibrium and produces a cellulose-formaldehyde compound, and subsequently treating the resulting product with cyanamide acidified with sulphuric acid to pH 5, 15 drying the material and thereafter heating it at a temperature from 135° to 140° C. 5 10 15

JNO. BOULTON,
T. H. MORTON.