This invention relates to the treatment of cellulosic textile material and in particular to improving the fastness to washing, without greatly impairing the fastness to light, or altering the original shade of said material which has been dyed with a direct cotton dyestuff, and at the same time giving it a softer silker handle and appearance.

I have found that the fastness to washing of cellulosic textile materials dyed with direct cotton dyestuffs is improved by treating the dyed material with a solution containing formaldehyde and an arylguanidine or a guanidine salt of an aliphatic dicarboxylic acid or a guanidine salt of an alkyl ester of an aliphatic dicarboxylic acid, either as such, or more probably in the form of their water-soluble condensates, and then converting the mixture or the soluble condensate into an insoluble condensate, for instance by heating to a temperature of 140° centigrade in the presence of an acid catalyst. In the case of the guanidine salts of aliphatic dicarboxylic acids and of alkyl esters of aliphatic dicarboxylic acids, the condensation with formaldehyde can, if desired, be carried out in neutral or alkaline media.

As an example of an arylguanidine which can be used according to this invention, I mention diphenylguanidine

\[ C_6H_5NH-\text{C-NH-CHO} \]

Examples of guanidine salts of aliphatic dicarboxylic acids are guanidine adipate and guanidine sebacate, while as an example of a guanidine salt of an alkyl ester of an aliphatic dicarboxylic acid I would mention the guanidine salt of ethyl adipate. The treatment can, if desired, be carried out in the presence of other water-soluble condensates such as urea-formaldehyde, thiourea-formaldehyde and melamine-formaldehyde.

When carrying out the process of the present invention I have found that it is desirable to avoid the use of a large excess of formaldehyde.

The following examples illustrate the invention but they are not to be considered as limiting it in any way.

**Example 1**

30 grams of diphenylguanidine are dissolved by warming with 30 cubic centimetres of 80 per cent acetic acid. 160 cubic centimetres of 40 per cent formaldehyde are added with sufficient distilled water to make 1 litre of solution. A sample of an all viscose rayon fabric which has been dyed with Rigan Sky Blue G (Soc. Chem. Ind. Basle) is immersed therein and after saturation the fabric is removed from the bath and squeezed evenly and is placed in a pin stenter frame and dried at just under 100° centigrade; it is then heated at 140° centigrade for 15 minutes. The resultant fabric has a good fastness to light, an improved fastness to washing and a soft silk-like handle and appearance.

**Example 2**

A water-soluble urea-formaldehyde condensate is made by mixing together 139 grams of urea, 313 cubic centimetres of 40 per cent formaldehyde and 19 cubic centimetres of methanol, the pH of the solution is adjusted to 9.5 and the solution is boiled under reflux for 5 minutes, after which it is cooled as rapidly as possible.

30 grams of diphenylguanidine are dissolved in 30 cubic centimetres of 80 per cent acetic acid and this solution is added to 100 grams of the urea-formaldehyde condensate prepared above and mixed with sufficient distilled water to make 1 litre of solution. A sample of an all viscose satin fabric which has been dyed with Rigan Sky Blue G is immersed therein and after soaking is removed from the solution and squeezed evenly. The fabric is placed in a pin stenter frame and dried at just under 100° centigrade. It is then heated at 140° centigrade for 15 minutes to form the insoluble condensation product. During this heating a part of the formaldehyde is split off from the urea-formaldehyde condensate and combines with the diphenylguanidine. The fastness to light and the fastness to washing of the dyed treated material are found to be improved.

If desired, a soluble diphenylguanidine-formaldehyde condensate may be substituted for the diphenylguanidine in this example.
insoluble condensation product. The resultant fabric possesses a soft silky handle, has very good fastness to light and is extremely fast to washing, for example when a piece of the fabric of dimensions 4” x 4” and a piece of white undyed fabric of dimensions 2” x 2” are treated in 70 cubic centimetres of a 0.2 per cent soap solution for 90 minutes at 60° centigrade, the fabrics removed and rinsed with distilled water the white piece remains unstained while the shade of the dyed piece is unchanged.

Example 4

30 grams of guanidine adipate are dissolved in a little warm water, the solution cooled and 200 cubic centimetres of 40 per cent formaldehyde added. Just before use 10 grams of ammonium sulphate dissolved in a little water are added and the whole bulked to 1 litre with distilled water. A length of an all viscose satin fabric which has been dyed with Chlorazol Fast Red K (Colour Index No. 278) is soaked therein and after soaking is removed from the solution and squeezed evenly. The fabric is then placed on a pin stenter frame, dried at just under 100° centigrade and finally heated at 140° centigrade for 15 minutes. The fabric obtained by this treatment has excellent fastness to light and washing and furthermore possesses a soft silk-like handle and appearance.

What I claim is:

1. The process of improving the fastness to washing of cellulosic textile materials dyed with direct cotton dyestuffs and imparting a soft silky handle thereto, by treating the dyed material with a solution containing a watersoluble condensate of formaldehyde with a substance selected from the group consisting of an aryliouanidine, a guanidine salt of an aliphatic dicarboxylic acid and a guanidine salt of an alkyl ester of an aliphatic dicarboxylic acid, and then converting the soluble condensate into an insoluble condensate.

2. The process of improving the fastness to washing of cellulosic textile materials dyed with direct cotton dyestuffs and imparting a soft silky handle thereto, by treating the dyed material with a solution containing formaldehyde and a substance selected from the group consisting of an aryliouanidine, a guanidine salt of an aliphatic dicarboxylic acid and a guanidine salt of an alkyl ester of an aliphatic dicarboxylic acid, and then converting the said mixture into an insoluble condensate.

3. A process as claimed in claim 1 in which the insoluble condensate is formed by heating in the presence of an acid catalyst.

4. A process as claimed in claim 2 in which the insoluble condensate is formed by heating in the presence of an acid catalyst.

JAS. H. MACGREGOR.