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# INCREASED RUB FASTNESS OF TEXTILE ARTICLES

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## ABSTRACT OF THE DISCLOSURE

A process for increasing the resistance to rubbing and crocking of dark shades of fabric such as wool, polyester, and the like. Protection of the surface of the dyed goods is effected by padding with an aqueous dispersion of collagen of molecular weight from about 20,000 to about 80,000. The padded material is then dried. When a finish of maximum resistance to water is desired, a formaldehyde producing compound, such as a urea formaldehyde resin, trioxane, and the like, can be added to the bath or can be used in the form of an after treatment. The effect is to partially tan the collagen, rendering it highly water resistant.

## BACKGROUND OF THE INVENTION

A serious problem has been encountered with a number of dyed textiles, particular dark shades, in which the coloring matter is insolubilized, for example after chromed azo dyes for wool or disperse dyes in the case of polyesters. These colors are, therefore, at least in part in the form of solid particles; in other words, in this respect they resemble pigments and are not totally chemical compounds with the substrate fabric. This is the reason, or one of the reasons, why dark shades of fabric present a serious problem of rub fastness and crock fastness.

In the past it has been practically standard procedure to apply a film-forming substance in an attempt to anchor the color particles. For this purpose conventional film-forming substances have been used, such as urea formaldehyde resins, acrylic polymers, and the like. In a number of cases, particularly with light color shades, commercially acceptable or tolerated fastness has been achieved. With certain dark shades, for example black colored worsteds of wool and polyester blends, no acceptable or even tolerable degree of fastness was reliably achievable with the conventional film-forming substances. It is with a greatly increased rub and crocking fastness that the present invention deals. It improves the results even with the fabrics where conventional treatments gave commercially tolerated results and is also useful in the cases, such as the dark worsted blend referred to above, where the ordinary treatments sometimes completely fail to produce a salable article.

## SUMMARY OF THE INVENTION

The present invention is based on the use of an aqueous dispersion of collagen, preferably of molecular weight of about 20,000 to 80,000, which is applied in the customary manner by padding and drying. It should be noted that the present invention is not directed to the use of all or every protein, and it is not known exactly why the particular class of proteins, collagens give the improved results. It is, therefore, not desired to limit the present invention to any particular theory of action. It is possible that the high physical strength of collagens is a factor. It is also possible that the fact that collagens are hydrophilic or at least not strongly hydrophobic, as is the case with some of the conventional film-forming



substances, may also be a factor, especially in crock resistance. These possibilities are advanced only as possible explanations, without limiting the invention to the theories or mechanisms set out. It is, of course, also possible that other factors may play a part, and conceivably even a greater part, than the characteristics referred to above. It is known that greatly improved fastness properties are obtained by the present invention, and this is claimed regardless of what the underlying reasons may be determined to be in the future.

The hydrophilic characteristics of collagens, which, as pointed out above, may be a factor in their improved results, are not entirely an unmixed blessing. For some purposes where maximum water resistance is desired, the hydrophilic and swelling properties of the collagen may be modified by using a tanning agent, such as formaldehyde, which partially tans to collagen, and such additional treatment is included in a more specific aspect of the present invention where maximum water resistance is desired. If tanning is used, it is a practical operating advantage of the present invention that the particular method of introducing the tanning agent is not critical. It may be used as an after treatment or it may be added to the collagen padding bath and a single treatment used. In the latter case, and with strongly antiseptic tanning agents, such as formaldehyde, no preservative may be needed. Otherwise it is customary in dealing with aqueous dispersions of collagen to protect against biodegradation by introducing a preservative, such as a phenol.

The novel features of the present invention lie primarily in the use of collagens and not in any particular exact amounts. It is advantageous that amounts of the film-forming substance can be comparable to the amounts used with conventional film-forming substances, and in general the same broad ranges may be used. As a practical operating range, which is not of high criticality, amounts from 2 pounds to 25 pounds per 2,000 yards of goods constitute a satisfactory practical operating range.

The general operating procedure in the present invention does not differ substantially from that used with other film-forming substances; in other words, the collagen in aqueous dispersion is applied as a pad bath to the goods in the conventional manner and is then dried. The drying temperature ranges should be suitable for collagens. In general the top drying temperature should not greatly exceed 350° F. in order not to damage the collagen. There is no sharp lower limit on temperature, but because of the hydrophilic nature of collagens, which hold water rather strongly, temperatures above 150° F. are usually needed to effect drying in a reasonable time. A very suitable range is between 180° and 350° F.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention will be described in connection with a black worsted 65% wool and 45% polyglycol terephthalate. Where available the dyestuffs will be identified by their color index number, using the conventional abbreviations "CI." 2600 yards of the fabric was dyed with a bath containing 64 pounds of 160% black dye CI 14645 and 2.6 pounds of yellow dye CI 18710. The bath also contained 161 pounds of the dispersed black dye for polyester dyeing sold by the Harshaw Company under their designation "Ester Black." The bath also contained the customary leveling agents and dispersing agents, including 4 pounds of sodium hexametaphosphate and 15 pounds of acetic acid. After dyeing, the mordant dyes were afterchromed with 21 pounds of sodium bichromate and the fabric rinsed and dried in the conventional man-

ner. Treatment for rub and crock resistance was in accordance with the following two examples:

EXAMPLE 1

The 2600 yards of black worsted was padded with 150 gallons of an aqueous bath containing 2 pounds of collagen molecular weight from 20,000 to 80,000, and 2 ounces of orthophenylphenol as a preservative. The padding operation was effected in conventional manner and the fabric was then dried at 200° F. The treated fabric showed excellent rub and crock fastness, whereas when the same fabric was treated with the same amount of a conventional film-forming agent, either urea formaldehyde resin or an acrylic resin, the fastness was so poor that the product was unsalable.

EXAMPLE 2

The procedure of Example 1 was repeated, but after padding the material was treated with formaldehyde by means of an aqueous, water soluble urea formaldehyde resin containing 16 pounds of resin. After tanning of the collagen was completed, the material was rinsed with water and dried as described in Example 1. Rub and crock fastness was as high as in Example 1, and the water resistance was increased markedly.

EXAMPLE 3

The procedure of Example 1 was repeated, but 6 pounds of trioxane was added to the collagen pad bath and the orthophenylphenol eliminated. After drying as described in Example 1, the fabric exhibited not only the same high rub and crock fastness but also had increased water resistance, in this respect being substantially identical to the product of Example 2.

We claim:

1. A process of increasing rub and crock fastness of textiles dyed with colors showing unacceptable rub and crock fastness by padding with an aqueous dispersion of collagen, the amount of collagen being from .2% of the weight of the textiles to 2.5%.

2. A process according to claim 1 in which the textile had a dark shade.



3. A process according to claim 2 in which the textile was a wool-polyester blend, the wool being dyed by dark mordant dyes and afterchromed and the polyester dyed with dark disperse dyes.

4. A process according to claim 3 in which the treatment with an aqueous dispersion of collagen included partial tanning of the collagen with formaldehyde.

5. A process according to claim 1 in which the treatment with an aqueous dispersion of collagen included partial tanning of the collagen with formaldehyde.

6. A process according to claim 2 in which the treatment with an aqueous dispersion of collagen included partial tanning of the collagen with formaldehyde.

7. A rub and crock fast dyed textile having a coating of collagen.

8. A rub and crock fast textile according to claim 7 in which the collagen is tanned.

9. A rub and crock fast textile according to claim 8 in which the textile is a wool-polyester blend dyed with dark shades of wool mordant dyes and afterchromed and the polyester dyed with dark disperse dye.

10. A rub and crock fast textile according to claim 7 in which the textile is a wool-polyester blend dyed with dark shades of wool mordant dyes and afterchromed and the polyester dyed with dark disperse dye.

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