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TEXTILE FINISHING PROCEDURES AND COMPOSITIONS

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The present invention relates to textile finishing and particularly to finishes for wool, wool blend fabrics or synthetic fabrics having a woolly texture construction or appearance.

It is among the objects of the present invention to provide novel compositions and procedures for enhancing hand, drape and texture of wool and particularly to render wool and wool blend fabrics so that they will have a high degree of dimensional stability.

Another object of the present invention is to provide enhanced shrinkage control for wool and wool blend fabrics in which both the felting shrinkage and relaxation shrinkage will be satisfactorily controlled and in which there will be a high degree of stabilization with a substantial reduction of felting shrinkage.

A further object of the present invention is to provide a finishing treatment which will eliminate the tendency of the individual fibers to twist and mat together resulting in shrinkage when the fabrics are exposed to heat, moisture or mechanical treatment.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

In accomplishing the above objects, it has been found most satisfactory to employ a composition or mixture of a water soluble dialkylol ethylene urea where the alkylene and the alkyl groups have one to four carbon atoms in combination with a water soluble alkylol melamine resin.

There desirably should be a relatively high proportion of the dialkylol ethylene urea and a low proportion of the methylol melamine resin in the ratio of between 2:1 to 6:1 with a preferred ratio of 4:1.

The preferred ethylene urea is dimethylol ethylene urea and the preferred melamine is a methylated, ethylated or propylated dimethylol melamine to hexamethylol melamine, a tetra methylol melamine being preferred.

The present textile finishing composition is preferably composed of

(a) Methylol melamine resin in water soluble state, with the methylol groups being present in the amount 2 to 6 methylol groups per mol of melamine in the proportion of about 5 parts by weight.

(b) Dimethylol ethylene urea (there being present two methylol groups) in proportion of about 20 parts by weight.

(c) Alkylated (methylated to amylated) dimethylol urea, propylated or butylated being preferred, which compound may be dispersed with a nonionic or anionic surface active agent in proportion of one part by weight.

Desirably there is utilized about 100 parts of the dimethylol ethylene urea to 10 to 30 parts of the dimethylol melamine.

In one preferred composition there is utilized about 77 parts by weight of a 40% solution of dimethylol ethylene urea (40% active) and about 23 parts of methylated methylol melamine (55% active) having two to six methylol groups.

In addition there is utilized about one to five parts of

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an ether, such as the methyl or ethyl ether of dimethylol urea.

To give some satisfactory compositions which may be utilized:

Example I

Compound	Parts by Weight	Active
Dimethylol ethylene urea (40% active)-----	77	30.00
Dimethylol melamine (55% active)-----	23	12.65
Molar ratio-----	3.15:1	

Example II

	Parts by weight
Dimethylol ethylene urea (40% active)-----	71
Methylated dimethylol melamine (55% active)-----	29

Example III

Dimethylol ethylene urea (40% active)-----	70
Methylated tetramethylol melamine (55% active)---	25
Methyl ether of dimethylol urea (55% active)-----	5

Example IV

Dimethylol ethylene urea (40% active)-----	70
Methylated trimethylol melamine (55% active)-----	25
Alkylated urea formaldehyde resin (propyl or butyl ether) in dispersion (50% active)-----	5

The above active percentages indicate the amount of active solid ingredients in the aqueous solution, the balance being principally water.

In the above formulations, the ethylene urea may be used in the form of the diethylol compound.

The melamine is preferably utilized in the form of its methylated methylol derivative. The ethylene urea is usually employed in the form of its dimethylol derivative.

In lieu of the dimethylol ethylene urea or in addition thereto, it is also possible to use alkylated urea formaldehyde resins, such as methyl, isopropyl or butyl compounds of urea formaldehyde resins which enhance the action of the methylol ethylene urea and melamine compounds.

The fabric is run through the above compositions in which the solid content of the bath may range from three to five percent.

Desirably included in the bath is a catalyst, such as zinc nitrate, in the amount of three to twenty percent of the solid content.

In place of zinc nitrate, it is also possible to utilize magnesium chloride, or ammonium chloride, sulphate or phosphate or various organic amine chlorides or sulphates.

It is also desirable to use softeners, for example, quaternaries, such as triethyl stearyl ammonium ethosulfate; polyglycol fatty esters, such as the stearic acid ester of polyethylene glycol, having a molecular weight of 1300-1600 (Carbowax 1540), or the stearic acid ester of polyethylene glycol 400; silicones, such as mixtures of dimethyl and methyl hydrogen polysiloxanes in emulsion form; or polyethylene used in emulsion form.

These softeners protect the wool fibers against any weakening or embrittling effect which might be caused by the resin and the high temperature curing used in setting this resin, as well as lubricating and softening effects. The range of softener is preferably 5% to 10% in the product, but may range from 2% to 20%.

The fabric should be secured, bleached and dyed before it passes through the bath containing the above compounds and the catalyst should be added to the bath just before the wool fabric passes therethrough.

After the treatment there should be a dry add-on of between three to five percent on the wool and the wool is then cured after drying for three minutes at 290° to 320° F.

The final fabric will have full hand with a soft dry worsted texture.

Felting shrinkage has been substantially eliminated.

The amount of dried resin applied to a fabric should not be over 5% and the textile during the drying and curing operations should be maintained at a pH value more acid than 5.0. Adverse fabric characteristics imparted by acidity and resinous by-products are circumvented by washing the cured textile for a few minutes in an alkaline detergent solution.

The present treatment imparts shrinkage resistance to wool by a combination of a dimethylol ethylene urea, an alkylated methylol melamine and an alkyl ether, preferably the butyl or isopropyl ether of dimethylol urea. The preferred parts by weight ratio is 3:1:0.2-0.5 of dimethylol ethylene urea, methylated methylol melamine, and dimethylol urea ether respectively.

A dispersing agent is used to emulsify the butyl or propyl dimethylol urea ether when used.

The above compositions of Examples I to IV when used on wool fabrics or wool-rayon fabrics or wool-cotton fabrics or wool-Dacron (polyethylene terephthalate) fabrics will produce a substantial reduction of the felting shrinkage, using 10% to 20% of the composition by weight based upon the weight of the bath.

As typical results when using a composition of 77% of dimethylol ethylene urea (40% active) and 23% methylated tetramethylol melamine (55% active), on a 60-40 wool-rayon union, using 12½ of the composition to which ¾ zinc nitrate was added as a catalyst.

The fabric was then dried and subsequently cured at 290° C. for 5 minutes.

Example V

[Wool-rayon union (60-40)]

	Shrinkage, percent	
	Warp	Filling
Untreated.....	4.5	5.5
Treated.....	2.5	0.5

Example VI

[Wool-rayon union (50-50)]

	Shrinkage, percent	
	Warp	Filling
Untreated.....	3.5	4.5
Treated.....	1.5	1.0

Example VII

[Wool-rayon union (40-60)]

	Shrinkage, percent	
	Warp	Filling
Untreated.....	6	7
Treated.....	0.5	0.7

The shrinkage tests were made by subjecting the above fabrics to washing in a laundry wheel for 2 hours at

120° F. in presence of 0.5% soap solution plus 0.2% soda ash, followed by rinsing in warm water at 120° F.

While there has been herein described a preferred form of the invention, it should be understood that the same may be altered in details and in relative arrangement of parts within the scope of the appended claims.

Having now particularly described and ascertained the nature of the invention, and in what manner the same is to be performed, what is claimed is:

1. A process of shrink proofing wool which comprises passing scoured, bleached and dyed wool through an aqueous bath to which a catalyst has just been added before passage of the wool, said catalyst being used in the amount of 1 to 5% of the solid content of the bath and the solid content of the bath ranging from 1 to 5% of the bath and containing dimethylol ethylene urea and methylated methylol melamine in the presence of zinc nitrate as a catalyst to give a solid pick up of between 2 to 5%, and drying and curing for three minutes at 290° F.
2. A process of shrink proofing wool which comprises treating the wool with an aqueous dispersion containing 1 to 5% of a composition of dimethylol ethylene urea and methylated methylol melamine in the presence of zinc nitrate to give a solid pick up of between 2 to 5% drying and curing for three minutes at 290° F.
3. A process of shrink proofing wool which comprises treating the wool with an aqueous dispersion containing 1 to 5% of a composition of dimethylol ethylene urea and methylated methylol melamine and also containing the methyl ether of dimethylol ethylene urea, there being utilized about 50 to 100 parts of dimethylol ethylene urea to each 10 to 30 parts of methylated methylol melamine and each 1 to 5 parts of the methyl ether of dimethylol ethylene urea.
4. A process of shrink proofing wool which comprises treating the wool with an aqueous dispersion containing 1 to 5% of a composition of dimethylol ethylene urea and methylated methylol melamine and also containing the methyl ether of dimethylol ethylene urea.
5. A process of shrink proofing wool which comprises treating the wool with an aqueous dispersion containing 1 to 5% of a composition of dimethylol ethylene urea and methylated methylol melamine.
6. A wool shrink proofing bath containing an aqueous dispersion of 1 to 5% of:
 - (1) 5 parts methylated methylol melamine by weight with 2 to 6 methylol groups per mol of melamine;
 - (2) dimethylol ethylene urea with two methylol groups per ethylene urea group in the amount of 20 parts by weight;
 - (3) methylated dimethylol urea in the amount of 1 part by weight;
 - (4) surface active agent in the amount of one part by weight for dispersing methylated dimethylol urea.

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