US 20010049247A1

(19) United States

(12) Patent Application Publication

Mellea et al.

(10) Pub. No.: US 2001/0049247 A1

(43) Pub. Date: Dec. 6, 2001

(54) METHODS FOR REDUCING FABRIC DRYING TIME AND FABRICS WITH IMPROVED PROPERTIES

(75) Inventors: **Michelle Frances Mellea**, Hamilton, OH (US); **George L. Payet**, Cincinnati, OH (US); **George Louis Strike**, Cincinnati, OH (US); **Lori Joanne Walker**, Loveland, OH (US)

Correspondence Address:
**THE PROCTER & GAMBLE COMPANY**
**PATENT DIVISION**
**IVORYDALE TECHNICAL CENTER - BOX 474**
**5299 SPRING GROVE AVENUE**
**CINCINNATI, OH 45217 (US)**

(73) Assignee: **The Procter & Gamble Company**

(21) Appl. No.: **09/821,312**

(22) Filed: **Mar. 29, 2001**

**Related U.S. Application Data**

(63) Non-provisional of provisional application No. 60/192,902, filed on Mar. 29, 2000.

**Publication Classification**

(51) **Int. Cl.**[7] .............................. **D04H 1/00**; D04H 3/00; D04H 5/00; D04H 13/00; D04H 1/74; D04H 3/05

(52) **U.S. Cl.** ........................... **442/414**; 442/327; 442/369

(57) **ABSTRACT**

Methods for reducing the trying time of fabric comprise treating the fabric with a treatment composition comprising formaldehyde, catalyst for crosslinking the formaldehyde with natural fibers in the fabric, and silicone elastomer or a precursor thereof, and heating the treated fabric to effect crosslinking of the formaldehyde. Fabrics having reduced drying times, particularly in combination with additional advantageous properties, are produced.

# METHODS FOR REDUCING FABRIC DRYING TIME AND FABRICS WITH IMPROVED PROPERTIES

## CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority under 37 U.S.C. §119(e) to U.S. Provisional Application Serail No. 60/192,902, filed Mar. 29, 2000 (Attorney Docket No.8010P).

## FIELD OF THE INVENTION

[0002] This invention relates to methods for reducing the drying time of fabrics, particularly fabrics containing natural fibers such as cotton, rayon and the like, and, in further embodiments, to methods for reducing the drying time of fabrics while providing the fabrics with good water absorbency, durable press and/or shrinkage resistance. This invention also relates to natural fabrics which exhibit reduced drying time, and, in further embodiments, to natural fabrics which exhibit reduced drying time in combination with good water absorbency, good durable press properties and/or shrinkage resistance.

## BACKGROUND OF THE INVENTION

[0003] Many fabrics, particularly fabrics comprising natural fibers, do not possess durable press (or "wash and wear" or "smooth-dry") performance or dimensional stability, i.e., shrinkage resistance. Cellulosic fabrics such as cotton have been treated with aminoplast resins, including N-methylol cross-linking resins such as dimethylol dihydroxyethyleneurea (DMDHEU) or dimethylol propylcarbamate (DMPC), to impart durable press properties, as disclosed, for example, in the Martin et al U.S. Pat. No. 4,521,176. Unfortunately, many reacted aminoplast resins break down during storage, thus releasing formaldehyde. The formaldehyde release may occur not only throughout the preparation of the fabric but also during garment-making. Further, garments or fabrics treated with aminoplast resins may release additional formaldehyde when stored under humid conditions. Aminoplast resins may also hydrolyze during washing procedures, resulting in a loss of the durable press performance. Additionally, aminoplast resins tend to give fabric a harsher handle, that is, make the fabric feel less soft. As the resins make the fabric feel less soft, the fabric must be treated with additional softeners. Unfortunately, the softeners tend to make fabric hydrophobic although it is often preferred that the fabric have hydrophilic properties for consumer comfort.

[0004] Cellulosic fibers have also been cross-linked with formaldehyde to impart durable press properties. For example, the Payet U.S. Pat. Nos. 3,960,482, 3,960,483, 4,067,688 and 4,104,022 disclose durable press processes which comprise impregnating a cellulosic fiber-containing fabric with an aqueous solution comprising a catalyst, and, while the fabric has a moisture content of above 20% by weight, exposing the fabric to formaldehyde vapors and curing under conditions at which formaldehyde reacts with the cellulose. The Payet U.S. Pat. No. 4,108,598 discloses a process which comprises treating cellulosic fiber-containing fabrics with an aqueous solution of formaldehyde and a catalyst, heat curing the treated fabric by introducing the fabric into a heating zone, and gradually increasing the temperature of the heating zone, thereby increasing the temperature of the heated fabric to prevent the loss of an amount of formaldehyde which will reduce the overall extent of curing. The Payet U.S. Pat. No. 5,885,303 also discloses a durable press process for cellulosic fiber-containing fabrics. The process comprises treating the fabric with an aqueous solution of formaldehyde, a catalyst capable of catalyzing the cross-linking reaction between formaldehyde and cellulose, and an effective amount of a silicone elastomer to reduce loss in tear strength in the treated fabric. Formaldehyde is generally less expensive than aminoplast resins, and formaldehyde treatment of cellulosic fabrics typically results in durable press properties which are more durable than those obtained by aminoplast resins.

[0005] Rayon garments are desirable by consumers for a variety of reasons. However, many durable press treatment processes that have been provided for cotton cellulose fabrics have not been suitable for rayon fabrics. Although rayon and cotton are both cellulosic fibers, they react very differently from one another. Particularly, rayon-containing fabrics exhibit significant shrinkage when subjected to aqueous washing or laundering and therefore generally require dry cleaning as opposed to washing in an aqueous environment.

[0006] The copending Payet application Ser. No. 09/163,319 discloses processes for providing rayon fabrics with durable press properties wherein a rayon fiber-containing fabric is treated with an aqueous mixture containing a high concentration of formaldehyde and a catalyst capable of catalyzing the cross-linking reaction between formaldehyde and the rayon, and the treated fabric is heat cured. Payet discloses that the fabric may be washed or laundered in an aqueous system and does not shrink substantially on aqueous washing. Additionally, a silicone elastomer may be employed to reduce loss in tear and tensile strength in the treated fabric.

[0007] An important feature of cellulose fabrics, both cotton and rayon particularly, is that they are naturally hydrophilic, and therefore absorb moisture. Typically, garments made of fabrics which are hydrophilic are more comfortable for wear and therefore are preferred by consumers over garments which are formed of hydrophobic, non-moisture absorbing fabrics. However, many conventional resin-based fabric treatments for improving durable press and/or for reducing shrinkage of cellulose fabrics, and particularly for cotton and rayon fabrics, also require the use of silicone softeners which inhibit the natural water absorbency of the cellulose fibers and render the fabrics hydrophobic. Such fabrics are therefore not preferred for garment use owing to their reduced ability or substantial inability to absorb moisture.

[0008] On the other hand, many hydrophilic fabrics retain water and are difficult to dry. Such fabrics typically require a greater amount of energy to thoroughly dry, resulting in increased care costs to consumers and to industries which perform large scale garment washing, for example the rental uniform industry. Even certain fabrics which have hydrophobic surface properties retain large amounts of water and are difficult to dry.

[0009] Accordingly, there is a continuing need to further improve individual characteristics of fabrics containing natural fibers, for example cotton and rayon, to improve the overall combinations of properties exhibited by such fabrics, and to reduce care costs associated with laundering of such fabrics.

## SUMMARY OF THE INVENTION

**[0010]** Accordingly, it is an object of the present invention to obviate problems of the prior art. It is a further object of the present invention to provide fabrics containing natural fibers and exhibiting an advantageous combination of properties. It is yet a further object of the present invention to provide fabrics containing natural fibers and having reduced drying times, and optionally exhibiting one or more of good water absorbency, good durable press properties and/or shrinkage resistance. It is a further object of the present invention to reduce care costs associated with laundering of such fabrics. It is a related object to provide methods for preparing fabrics which exhibit advantageous combinations of properties and which are suitable for aqueous washing or laundering.

**[0011]** These and additional objects are provided by the methods and fabrics of the invention. In one embodiment, the invention is directed to methods for reducing the drying time of fabric, which methods comprise treating the fabric with a treatment composition comprising formaldehyde, catalyst for crosslinking the formaldehyde with natural fibers in the fabric, and silicone elastomer or a precursor thereof, and heating the treated fabric to effect crosslinking of the formaldehyde. In another embodiment, the invention is directed to methods for reducing the drying time of fabric while providing the fabric with good water absorbency and durable press properties, which methods comprise treating the fabric with a treatment composition comprising formaldehyde, catalyst for crosslinking the formaldehyde with natural fibers in the fabric, and silicone elastomer or a precursor thereof, and heating the treated fabric to effect crosslinking of the formaldehyde. In yet another embodiment, the invention is directed to methods for reducing the drying time of fabric while providing the fabric with good water absorbency and shrinkage resistance properties, which methods comprise treating the fabric with a treatment composition comprising formaldehyde, catalyst for crosslinking the formaldehyde with natural fibers in the fabric, and silicone elastomer or a precursor thereof, and heating the treated fabric to effect crosslinking of the formaldehyde. In yet additional embodiments, the invention is directed to fabrics comprising natural fibers, having a crosslinked formaldehyde treatment and being provided with a silicone elastomer, wherein the fabric exhibits a reduced drying time and does not comprise 100% cotton, and to fabrics comprising rayon fibers and exhibiting a reduced drying time.

**[0012]** The methods of the invention are advantageous in providing fabrics which exhibit reduced drying time, particularly in combination with other desirable properties, for example good water absorbency, durable press properties and/or shrinkage reduction.

**[0013]** These and additional aspects, objects and advantages of the invention are more fully described in the detailed description.

## DETAILED DESCRIPTION

**[0014]** The present invention is directed to methods for providing fabrics, particularly fabrics comprising natural fibers, with reduced drying time. Within the context of the present specification, the term "reduced drying time" means a reduction in the ability to retain water and, therefore, a reduction in the time required to dry a sample of a particular fabric as compared with an untreated sample of the fabric and/or as compared with a conventional aminoplast resin-treated sample of the fabric. An untreated sample of the fabric refers to a sample of the fabric which does not have any chemical finishing treatment thereon. In specific embodiments, the methods of the invention provide fabrics with drying times which are from about 30% to about 55% less than the drying times of untreated fabric. In further embodiments, the methods of the invention provide fabrics with drying times which are from about 10% to about 45% less than the drying times of conventional aminoplast resin-treated fabric. In selected embodiments, the invention is directed to methods for providing fabrics, particularly fabrics comprising natural fibers, with reduced drying time in combination with one or more of good water absorbency, good durable press properties and/or shrinkage resistance. This invention also relates to fabrics which have reduced drying time, particularly in combination with one or more of good water absorbency, good durable press and/or shrinkage resistance, and which can be subjected to aqueous laundering.

**[0015]** Within the context of the present specification, reference to a fabric's ability to retain water refers to the total amount of water which is absorbed by the fabric, i.e., the load, and which must be removed to dry the fabric. Thus, the reduction in a fabric's drying time is a result of a reduction in the amount of water the fabric absorbs. This reduction in the amount of water which the fabric absorbs is to be contrasted with the rate at which a fabric will absorb surface water. The rate at which a fabric absorbs surface water is a measure of its hydrophilic/hydrophobic qualities, with high absorption rates indicating hydrophilic fabric and low absortion rates indicating hydrophobic fabric. Surprisingly, the methods of the present invention provide fabrics with reduced drying time, for example as a result of reduced water retention, while maintaining or providing good hydrophilic characteristics, i.e., high rates of water absorbency.

**[0016]** The fabrics employed in the present invention preferably comprise natural fibers. As used herein, "individual fiber" refers to a short and/or thin filament, such as short filaments of cotton as obtained from the cotton boll, short filaments of wool as sheared from the sheep, filaments of cellulose or rayon, or the thin filaments of silk obtained from a silkworm cocoon. As used herein, "fibers" is intended to include filaments in any form, including individual filaments, and the filaments present in formed yams, fabrics and garments.

**[0017]** As used herein, "yarn" refers to a product obtained when fibers are aligned. Yams are products of substantial length and relatively small cross-section. Yarns may be single ply yams, that is having one yarn strand, or multiple ply yams, such as 2-ply yam which comprises two single yarns twisted together or 3-ply yarn which comprises three yarn strands twisted together. As used herein, "fabrics" generally refer to knitted fabrics, woven fabrics, or non-woven fabrics prepared from yarns or individual fibers, while "garments" generally refer to wearable articles comprising fabrics, including, but not limited to, shirts, blouses, dresses, pants, sweaters and coats. Non-woven fabrics include fabrics such as felt and are composed of a web or batt of fibers bonded by the application of heat and/or pressure and/or entanglement. "Textiles" includes fabrics, yarns, and articles comprising fabrics and/or yams, such as garments, home goods, including, but not limited to, bed and table linens, draperies and curtains, and upholsteries, and the like.

[0018] As used herein, "natural fibers" refer to fibers which are obtained from natural sources, such as cellulosic fibers and protein fibers, or which are formed by the regeneration of or processing of natural occurring fibers and/or products. Natural fibers are not intended to include fibers formed from petroleum products. Natural fibers include fibers formed from cellulose, such as cotton fiber and regenerated cellulose fiber, commonly referred to as rayon, or acetate fiber derived by reacting cellulose with acetic acid and acetic anhydride in the presence of sulfuric acid. As used herein, "natural fibers" are intended to include natural fibers in any form, including individual filaments, and fibers present in yarns, fabrics and other textiles, while "individual natural fibers" is intended to refer to individual natural filaments.

[0019] As used herein, "cellulosic fibers" are intended to refer to fibers comprising cellulose, and include, but are not limited to, cotton, linen, flax, rayon, cellulose acetate, cellulose triacetate, hemp and ramie fibers. As used herein, "rayon fibers" is intended to include, but is not limited to, fibers comprising viscose rayon, high wet modulus rayon, cuprammonium rayon, saponified rayon, modal rayon and lyocell rayon. "Protein fibers" are intended to refer to fibers comprising proteins, and include, but are not limited to, wools, such as sheep wool, alpaca, vicuna, mohair, cashmere, guanaco, camel and llama, as well as furs, suedes, and silks.

[0020] As used herein, "synthetic fibers" refer to those fibers which are not prepared from naturally occurring filaments and include, but are not limited to, fibers formed of synthetic materials such as polyesters, polyamides such as nylons, polyacrylics, and polyurethanes such as spandex. Synthetic fibers include fibers formed from petroleum products.

[0021] Fabrics for use in the present invention preferably comprise natural fibers, which natural fibers may be included in any form, including, but not limited to, in the form of individual fibers (for example in nonwoven fabrics), or in the form of yarns comprising natural fibers, woven or knitted to provide the fabrics. Additionally, the fabrics may be in the form of garments or other textiles comprising natural fibers. The fabrics may further comprise synthetic fibers. Preferably, the fabrics comprise at least about 20% natural fibers. In one embodiment, the fabrics comprise at least about 50% natural fibers such as cotton fibers, rayon fibers or the like. In another embodiment, the fabrics comprise at least about 80% natural fibers such as cotton fibers, rayon fibers or the like, and in a further embodiment, the fibers comprise 100% natural fibers. Fabrics comprising cellulose fibers such as cotton and/or rayon are preferred for use in the present invention.

[0022] While not being bound by theory, it is believed that when natural fibers are treated with a composition comprising formaldehyde and a catalyst capable of cross-linking formaldehyde with a natural fiber, a chemical modification of the natural fibers occurs. It is believed that the formaldehyde reacts chemically with the natural fibers to cross-link the individual polymer chains of the natural fibers. The formaldehyde treatment also provides durable press properties and/or dimensional stability, i.e., reduced shrinkage. In accordance with the present methods, a silicone elastomer or precursor thereof is included in the formaldehyde treatment and the fabrics surprisingly exhibit the reduced ability to retain water, i.e., the reduced drying time. The combination of the formaldehyde-silicone elastomer treatment also can provide the fabrics with good water absorbency. The fabrics preferably also exhibit good strength, for example good tear strength.

[0023] To provide the crosslinked formaldehyde treatment, the fabric is typically treated with a treatment composition comprising formaldehyde, a catalyst and a silicone elastomer or precursor thereof, followed by drying and/or curing of the treated fabric. Formaldehyde is generally available in an aqueous solution, referred to as formalin, comprising water, about 37% by weight formaldehyde, and generally about 10% to 15% by weight methanol.

[0024] The amount of formaldehyde in the treatment composition is preferably sufficient to impart a durable press property and/or shrinkage resistance to the fabric. Generally the fabric is treated with at least about 3% by weight formalin, and preferably with from about 3% to about 35% by weight formalin, based on the weight of the fabric. In one embodiment, for example wherein the fabric comprises cotton fibers, the fabric is treated with about 3% to about 8% formalin, based on the weight of the fabric. In another embodiment, for example wherein the fabric comprises rayon fibers, the fabric is treated with from about 10% to about 20% by weight formalin, based on the weight of the fabric. In yet another embodiment, for example wherein the fabric comprises a 50/50 blend of rayon and polyester fibers, the fabric is treated with from about 5% to about 10%, more preferably about 8%, by weight formalin, based on the weight of the fabric. As used herein, "formalin" refers to an aqueous solution comprising 37%, by weight, formaldehyde. As will be apparent to one of skill in the art, formaldehyde solutions comprising levels of formaldehyde other than 37%, by weight, may also be used. Using the above ranges of formalin, the fabric is treated with actual formaldehyde, as opposed to formalin, at a level of from about 1% to about 13%, preferably from about 1% to about 12%, based on the weight of the fabric. Thus, in one embodiment, for example wherein the fabric comprises cotton fibers, the fabric is treated with about 1% to about 3% formaldehyde, as opposed to formalin, based on the weight of the fabric. In another embodiment, for example wherein the fabric comprises rayon fibers, the fabric is treated with from about 4% to about 8% by weight formaldehyde, as opposed to formalin, based on the weight of the fabric. In yet another embodiment, for example wherein the fabric comprises a 50/50 blend of rayon and polyester fibers, the fabric is treated with from about 2% to about 4%, preferably about 3%, by weight formaldehyde, as opposed to formalin, based on the weight of the fabric.

[0025] Suitable catalysts are those capable of catalyzing a cross-linking reaction between formaldehyde and a natural fiber, and preferably are catalysts capable of catalyzing the cross-linking of formaldehyde with a natural fiber comprising hydroxy groups, such as cellulosic fibers. Catalysts which may be used include mineral acids, organic acids, salts of strong acids, ammonium salts, alkylamine salts, metallic salts and combinations thereof. In one embodiment the catalyst is other than a mineral acid.

[0026] Suitable mineral acid catalysts include hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid and boric acid. Suitable organic acids include oxalic acid, tartaric acid, citric acid, malic acid, glycolic acid, methoxyacetic acid, chloroacetic acid, lactic acid, 3-hydroxybutyric acid, methane sulfonic acid, ethane sulfonic acid, hydroxymethane sulfonic acid, benzene sulfonic acid, p-toluene sulfonic acid, cyclopentane tetracarboxylic acid, butane tetracarboxylic acid, tetrahydrofuran-tetracarboxylic acid, nitrilotriacetic acid, and ethylenediaminetetraacetic acid. Suitable salts of strong acids include sodium bisulfate, sodium dihydrogen phosphate and disodium hydrogen phosphate. Suitable ammonium salts include ammonium chloride, ammonium nitrate, ammonium sulfate, ammonium bisulfate, ammonium dihydrogen phosphate and diammonium hydrogen phosphate. Suitable alkanolamine salts include the hydrochloride, nitrate, sulfate, phosphate and sulfamate salts of 2-amino-2-methyl- 1 -propanol, tris (hydroxymethyl) aminomethane and 2-amino-2-ethyl-1-3-propanediol. Suitable metal salts include aluminum chlorohydroxide, aluminum chloride, aluminum nitrate, aluminum sulfate, magnesium chloride, magnesium nitrate, magnesium sulfate, zinc chloride, zinc nitrate and zinc sulfate, and mixtures thereof.

[0027] In one embodiment of the invention, the catalyst is a halide or nitrate salt of zinc or magnesium, and preferably the catalyst is magnesium chloride. An organic acid, such as citric acid, may be used in combination with the halide or nitrate salt of zinc or magnesium. Generally the molar ratio of metal salt to organic acid is from about 5:1 to about 20:1. In one embodiment, the catalyst comprises magnesium chloride and citric acid, while in another embodiment the catalyst comprises magnesium chloride and aluminum chloride.

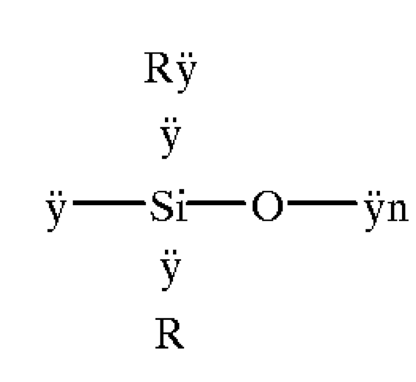
[0028] The fabric is typically treated with an amount of catalyst sufficient to catalyze cross-linking of the natural fibers by the formaldehyde. In one embodiment, the catalyst may be employed in an amount sufficient to provide a formaldehyde:catalyst weight ratio of from about 10:1 to about 1:10, and preferably from about 5:1 to about 1:5.

[0029] The formaldehyde treatment composition may comprise, by weight, up to about 12% of a catalyst solution, and preferably from about 1% to about 9% of a catalyst solution. Generally the catalyst solution comprises from about 20% to about 50%, by weight catalyst. In one embodiment, for example wherein the fabric comprises cotton fibers, the treatment solution comprises from about 2 to about 4% by weight of a catalyst solution comprising about 30% by weight catalyst, and in another embodiment, for example wherein the fabric comprises rayon fibers, the treatment solution comprises from about 6% to about 8% by weight of a catalyst solution comprising about 30% by weight catalyst. In yet a further embodiment, the catalyst solution comprises about 40%, by weight, magnesium chloride, for a final magnesium chloride level of up to about 5%, by weight of the treatment solution. Suitable catalyst solutions include FREECAT® LF (magnesium chloride and citric acid) and FREECAT® No. 9 (aluminum chloride and magnesium chloride), commercially available from B. F. Goodrich.

[0030] The formaldehyde treatment composition typically comprises a liquid carrier, preferably water, although, as noted above, the formalin used to prepare the treatment composition may comprise small amounts of organic solvents such as methanol or the like. In one embodiment, the treatment composition is free of any organic solvents other than that present in the formalin or the catalyst solution. In another embodiment, the carrier may comprise pentamethylcyclosiloxane.

[0031] According to the present methods, a silicone elastomer or precursor thereof is included in the formaldehyde-containing treatment composition with which the fabric is treated. Thus, the formaldehyde treatment composition comprises formaldehyde, catalyst and silicone elastomer or a precursor thereof. It has been surprisingly discovered that the combination of a silicone elastomer or precursor thereof and the formaldehyde-containing treatment composition provides the fabric with reduced ability to retain water and therefore with reduced drying times. The reduced drying times may also be provided in combination with one or more of good water absorbency, good durable press and/or shrinkage resistance properties. This is surprising in that many conventional treatments which improve one of these properties actually degrade other of these desirable properties. Thus, the methods and fabrics of the invention are not only advantageous in providing fabrics with reduced drying times, but also in providing fabrics with reduced drying times in combination with good water absorbency, good durable press and/or shrinkage resistance properties. The silicone elastomer may also be effective to reduce the loss in tear strength that typically occurs during formaldehyde cross-linking of fibers.

[0032] Various silicone elastomers are known in the art and are suitable for use in the methods and fabrics of the invention. In one embodiment, the silicone elastomer is a polysiloxane. Similarly, the silicone elastomer precursor which forms an elastomer upon curing, typically by self curing, may be a polysiloxane. Elastomers are polymers which are capable of being stretched with relatively little applied force, and which return to the unstretched length when the force is released. Silicone elastomers have a backbone made of silicon and oxygen with organic substituents attached to silicon atoms, with a number n of repeating units of the general formula:




[0033] The groups R and Rÿ are each independently selected from lower alkyls, preferably $C_1$-$C_3$ alkyls, phenyl, or lower alkyls or phenyls comprising a group reactive to cellulose, such as hydroxy groups, halogen atoms, for example, fluoride, or amino groups. Suitable elastomers include those disclosed in U.S. Pat. No. 5,885,303, incorporated herein by reference.

[0034] A preferred silicone elastomer or precursor composition comprises up to about 60%, by weight, silicone solids. In one embodiment, the silicone elastomer or precursor composition comprises from about 20% to about 60%, preferably from about 30% to about 60%, by weight of silicone solids, while in another embodiment the silicone elastomer or precursor composition comprises from about 20% to about 30% by weight of silicone solids. Suitable silicone elastomer precursors include a dimethyl silicone emulsion containing from about 30% to about 60%, by weight, silicone solids, commercially available as SM2112 from General Electric. Another suitable commercially available elastomer precursor is Sedgesoft ELS from Sedgefield Specialties, containing from about 24% to about 26%, by weight, silicone solids.

[**0035**] When the silicone elastomer or precursor thereof is applied to the fabric with a liquid formaldehyde treatment composition, the liquid treatment composition may comprise up to about 10%, preferably from about 1% to about 5%, more preferably from about 1% to about 3%, by weight of the elastomer or precursor solids. In one embodiment, the treatment composition comprises from about 1% to about 3%, preferably from about 1.5% to 3%, by weight silicone solids, while in another embodiment, the composition comprises from about 1% to about 1.5% by weight silicone solids.

[**0036**] The formaldehyde treatment composition may be applied to the fabric in accordance with any of the conventional techniques known in the art. In one embodiment, the treatment composition may be applied to the fabric by saturating the fabric in a trough and squeezing the saturated fabric through pressure rollers to achieve a uniform application (padding process). As used herein "wet pick-up" refers to the amount of treatment composition applied to and/or absorbed into the fabric based on the original weight of the fabric. "Original weight of the fabric" or simply "weight of the fabric" refers to the weight of the fabric prior to its contact with the treatment composition. For example, 50% pick-up means that the fabric picks up an amount of treatment solution equal to 50% of the fabric's original weight. Preferably the wet pick-up is at least 20%, preferably from about 50% to 100%, more preferably from about 65% to about 80%, by weight of the fabric.

[**0037**] Other application techniques which may be employed include kiss roll application, engraved roll application, printing, foam finishing, vacuum extraction, spray application or any process known in the art. Generally theses techniques provide lower wet pick-up than the padding process. The concentration of the chemicals in the solution may be adjusted to provide the desired amount of chemicals based on the original weight of the fabric (OWF).

[**0038**] In a preferred embodiment, the formaldehyde treatment composition is applied in an amount to insure a moisture content of more than 20% by weight, preferably more than 30% by weight, on the fabric before curing. Optionally, a wetting agent may be included in the treatment composition to facilitate obtaining the desired moisture content. Nonionic wetting agents are preferred.

[**0039**] Once the treatment composition has been applied to the fabric, the fabric is typically heated for a time and at a temperature sufficient for the cross-linking of the natural fibers with the formaldehyde. For example, the fabric may be heated at a temperature greater than about 250ÿF, preferably from about 250ÿF to about 350ÿF, in an oven for a period of from about 15 seconds to about 15 minutes, preferably from about 45 seconds to about 3 minutes, to react the formaldehyde with the natural fibers in the fabric and affect crosslinking of the formaldehyde and natural fibers to provide durable press and/or shrinkage resistance effects. There is an inverse relationship between curing temperature and curing time, that is, the higher the temperature of curing, the shorter the dwell time in the oven; conversely, the lower the curing temperature, the longer the dwell time in the oven.

[**0040**] In another embodiment, the present invention comprises methods for reducing the drying time of fabric, wherein the silicone elastomer may be included in the treated fabric by means of a separate treatment step before or after the formaldehyde crosslinking treatment. Additionally, if the silicone elastomer or precursor thereof is applied to the fabric subsequent to treatment with the formaldehyde crosslinking composition, the silicone elastomer precursor thereof may be applied prior to or subsequent to the heating step which is employed to affect curing of the formaldehyde with the natural fibers of the fabric, although application prior to heating is preferred. The applied silicone elastomer or precursor thereof may be dried, with self curing of the precursor being affected thereby.

[**0041**] In one embodiment, the fabrics according to the present invention also exhibit good water absorbency. As is known in the art, the water absorbency of a fabric indicates the ability of the fabric to absorb moisture, particularly surface moisture, and more specifically, the rate at which surface water is absorbed. As employed in the present invention, good water absorbency indicates that the fabric absorbs a drop of water placed thereon, in accord with the methods described in AATCC Method 79-1995, in less than about 100 seconds, even after the fabric has been aqueous laundered at least once. In a more specific embodiment, the fabrics according to the present invention exhibit a water absorbency time, in accord with the methods described in AATCC Method 79-1995, of less than about 80 seconds, even after the fabric has been aqueous laundered at least once. In yet a further embodiment, the fabrics according to the present invention exhibit a water absorbency time, in accord with the methods described in AATCC Method 79-1995, of less than about 60 seconds, even after the fabric has been aqueous laundered at least once. One skilled in the art will appreciate that various fabric preparation processes may involve application of a wetting agent to the fabric. The water absorbency properties as disclosed herein are exhibited by the fabric after any such wetting agent has been removed, for example by laundering or the like. Thus, the good water absorbency properties are maintained after one or more washings or launderings of the fabrics. The good water absorbency properties are particularly advantageous when the fabric is used in garment manufacture, as garments which absorb moisture are generally more comfortable for wear and therefore are preferred by consumers over garments which are formed of hydrophobic, non-moisture absorbing fabrics.

[**0042**] In another embodiment, the fabrics according to the invention exhibit good durable press properties and/or good shrink resistance. In one embodiment, it is preferred that the fabric exhibit good durable press, for example a DP (durable press) rating of at least about 3.0, preferably at least about 3.25, and more preferably at least about 3.5, as measured according to AATCC Test Method 124-1996, after one aqueous washing, and preferably after five aqueous washings, and/or good shrinkage resistance, for example a length shrinkage and a width shrinkage of less than about 10% each, preferably less than about 5% each, more preferably less than about 4% each, and even more preferably less than about 2% each, and in specific embodiments less than about 1%, as measured according to AATCC Test Method 135-1995, after one aqueous washing, and preferably after five aqueous washings. Shrinkage may also be measured according to AATCC Test Method 150-1995. In further preferred embodiments, the fabrics exhibit good filling tensile and tear strengths, for example of at least about 25 pounds and at least about 24 ounces, respectively, as measured according to ASTM D-5035-95 for tensile strength, and ASTM D-2261-96 for tear strength.

[**0043**] In another embodiment, cellulose fabrics having a crosslinked formaldehyde treatment and exhibiting reduced drying times are obtained, provided that the fabric does not comprise 100% cotton. These fabrics may comprise greater than about 20% cotton fibers, greater than about 50% cotton fibers, greater than about 80% cotton fibers, greater than about 20% rayon fibers, greater than about 50% rayon fibers, greater than about 80% rayon fibers, or about 100% rayon fibers.

[**0044**] In processes in accordance with the present invention, unreacted formaldehyde remaining on the fabric is removed during subsequent processing of the fabric. Generally, the final substrate will comprise less than about 300 ppm formaldehyde, preferably less than about 200 ppm formaldehyde, more preferably less than about 100 ppm formaldehyde, and even more preferably less than about 50 ppm formaldehyde, as measured according to AATCC Test Method 112-1993.

[**0045**] Some polysiloxanes, generally referred to as silicone oils, have a liquid form, are not elastomeric and do not self-crosslink. Silicone oils include, for example, non-reactive linear polydimethyl siloxanes, that is, siloxanes which are not capable of further reaction with other silicones and are not capable of a self curing reaction. Silicone oils have a tendency to produce non-removable spots on fabrics. In contrast, the silicone elastomers used in the present invention generally do not produce such spots. Although the fabrics or treatment compositions may comprise silicone oil, in one embodiment, the fabrics and treatment compositions are substantially free of, and preferably are free of, silicone oil. As used herein, substantially free of silicone oils means the treatment compositions and fabrics comprise less than 1%, by weight, silicone oil.

[**0046**] Thermosetting resins used to impart durable press properties to fabrics are generally aminoplast resins which are the products of the reaction of formaldehyde with compounds such as urea, thiourea, ethylene urea, dihydroxyethylene urea and melamines. As used herein “aminoplast resins” is intended to include N-methylolamide cross-linking agents such as dimethylol dihydroxyethylene urea, dimethylol urea, dimethylolethylene urea, dimethylol propylene urea, dimethylol methyl carbamate, dimethylol n-propylcarbamate, dimethylol isopropylcarbamate trimethylolated melamine, and tris(methoxymethol) melamine. Preferably, the fabrics, methods and formaldehyde treatment compositions of the invention are substantially free of, and more preferably are free of, aminoplast resins, including those aminoplast resins containing or formed from N-methylol cross-linking agents. As used herein, “substantially free” of aminoplast resins is intended to mean the fabrics and treatment solutions comprise less than about 0.5%, by weight, aminoplast resin or methylol cross-linking agent.

[**0047**] Prior to treatment with the formaldehyde composition and silicone elastomer or precursor thereof, the fabric may optionally be prepared using any fiber, yarn, or textile pretreatment preparation techniques known in the art. Suitable preparation techniques include brushing, singeing, desizing, scouring, mercerizing, and bleaching. For example, fabric may be treated by brushing which refers to the use of mechanical means for raising surface fibers which will be removed during singeing. The fabric may be then be singed using a flame to burn away fibers and fuzz protruding from the fabric surface. Textiles may be desized, which refers to the removal of sizing chemicals such as starch and/or polyvinyl alcohol, that are put on yams prior to weaving to protect individual yams. The fabrics may be scoured, which refers to the process of removing natural impurities such as oils, fats and waxes and synthetic impurities such as mill grease from fabrics. Mercerization refers to the application of high concentrations of sodium hydroxide to a fabric to alter the morphology of fibers, particularly cotton fibers. Fabrics may be mercerized to improve fabric stability and luster. Finally, bleaching refers to the process of destroying any natural color bodies within the natural fiber. A typical bleaching agent is hydrogen peroxide.

[**0048**] The various preparation techniques are optional and dependent upon the desired final product. For example, when the final fabric is to be dyed a dark color, there may be no need to bleach the substrate. Similarly, there may be no need to desize a knit which was prepared without using any sizing agents, and no need to separately scour knits and woven textiles as the scouring may be done during bleaching.

[**0049**] The following examples are set forth to demonstrate the methods of the present invention and the reduced drying times which are obtained in fabrics by the methods of the present invention. Throughout the examples and the present specification, parts and percentages are by weight unless otherwise specified. The following examples are illustrative only and are not intended to limit the scope of the methods and fabrics of the invention as defined by the claims.

## EXAMPLE 1

[**0050**] In this example, men’s shirts are formed of a fabric which comprises an 85/15 blend of rayon/flax provided with a formaldehyde crosslinking treatment in accordance with the invention. Generally, each fabric is contacted with an aqueous solution comprising about 10% to 20% formalin, a weight ratio of formalin to catalyst solution of about 18:5, and about 3% (solids) of a silicone elastomer commercially available from General Electric under the designation GE SM2112. The aqueous solution is padded on the fabric to provide a moisture content of greater than about 30% and the treated fabric is heated at a temperature greater than about 300° F. for a period of time sufficient to effect crosslinking of the formaldehyde with the cellulose in the rayon and flax fibers.

[0051] The resulting fabric samples and untreated control samples of the fabric are run through a conventional home laundry cycle. Both treated and untreated wet fabric samples are subjected to drying in a dryer. The treated fabric samples dry in about 20 minutes while the untreated samples dry in about 50 minutes. Additionally, garments formed of the treated and untreated fabric, respectively, are subjected to conventional line drying. The treated garments dry in about 3 hours while the untreated garments dry in about 5 hours. For further comparison, conventional aminoplast resin-treated samples and garments of the fabric are similarly run through a conventional home laundry cycle and subjected to machine drying and line drying, respectively. The resin-treated samples dry in about 30 minutes in the machine dryer while the resin-treated garments dry in about 4 hours on the line. Thus, the fabrics and garments according to the present invention exhibit reduced drying times as compared with untreated fabrics and garments and as compared with conventional aminoplast resin treated fabrics and garments.

EXAMPLE 2

[0052] In this example, fabric swatches are provided with a formaldehyde crosslinking treatment in accordance with the invention. A first type of fabric swatch samples, fabric 1 comprising an 85/15 rayon/flax blend, are treated in accordance with the general process described in Example 1. A second set of fabric swatch samples, fabric 2 comprising 100% cotton shirting fabric, are treated in a similar manner wherein the aqueous solution comprises about 3% to about 8% formalin, based on the weight of the fabric. The fabric swatch samples treated according to the invention, untreated fabric swatch samples of the same fabrics and fabric swatch samples of the fabrics which are treated with a conventional aminoplast resin treatment are washed in a home washer of the type typically found in the United States and then subjected to tumble drying in a home dryer. During the drying processes, the processes are interrupted and the various fabric samples are weighed to determine their weight relative to the respective fabric sample swatches prior to washing. In a first set of experiments, the fabric swatch samples are washed with a combination of liquid Tide® Free and Downy® Premium Care (wash 1). In a second set of experiments, fabric swatch samples are washed with a combination of liquid Tide® Free and Downy® Regular-Unscented (wash 2). At least three swatches of each fabric sample are tested, with the average weight of the fabric samples as a percentage of the original weight 1) after washing but before any drying, 2) after 10 minutes of drying, and 3) after 20 minutes of drying, being set forth in Table 1.

TABLE 1

| | | Weight of Fabric Swatch as Percentage of Prewash Weight | | |
|---|---|---|---|---|
| Sample | Fabric Swatch Sample/Wash process | % of original wt, before drying | % of original wt, after 10 min drying | % of original wt, after 20 min drying |
| 2A | 1-untreated/wash 1 | 183.1 | 125.7 | 94.9 |
| 2B | 1-conventional resin/wash 1 | 143.8 | 104.6 | 94.0 |
| 2C | 1-inventive/wash 1 | 142.5 | 96.0 | 94.0 |
| 2D | 2-untreated/wash 1 | 134.6 | 95.0 | — |
| 2E | 2-conventional resin/wash 1 | 131.7 | 95.5 | — |
| 2F | 2-inventive/wash 1 | 130.6 | 97.1 | — |
| 2G | 1-untreated/wash 2 | 182.8 | 116.1 | 92.1 |
| 2H | 1-conventional resin/wash 2 | 159.2 | 107.5 | 97.4 |
| 2I | 1-inventive/wash 2 | 133.8 | 94.7 | 93.2 |
| 2J | 2-untreated/wash 2 | 148.2 | 111.2 | 101.9 |
| 2K | 2-conventional resin/wash 2 | 130.3 | 98.0 | 95.1 |
| 2L | 2-inventive/wash 2 | 142.5 | 107.8 | 103.3 |

[0053] The results set forth in Table 1 demonstrate that the fabric samples 2C, 2F, 2I and 2L according to the invention contain less water prior to any drying and dry more quickly as compared with the untreated fabric samples 2A, 2D, 2G and 2J. The improvements in reduced drying time are particularly evident with respect to fabric swatch samples of fabric 1 which comprise the rayon/flax blends. Additionally, the fabric swatch samples according to the present invention exhibit substantially similar or better drying times as compared with the conventional resin-treated samples.

[0054] Fabric samples 2A-2C are also evaluated to determine their water retention according to ASTM 2402-94, Water Retention of Textile Fibers (Centrifuge Method). Samples 2A, 2B and 2C exhibited water retention of 113%, 90% and 53%, respectively. Thus, the fabric treated according to the invention desirably exhibited the lowest water retention. Fabrics treated according to the methods of the invention typically exhibit reductions in water retention of greater than about 20%, more specifically greater than about 30%, and in some cases greater than about 40%, as compared with untreated fabrics and/or conventional resin-treated fabrics.

EXAMPLE 3

[0055] In this example, fabric swatch samples as described in Example 2 are subjected to washing in a Miele washer of the type typically employed in Europe, followed by line drying in order to evaluate the line drying times of the respective fabrics. At least three swatches of each fabric are tested, with the average weight of the fabric swatches during drying being set forth as a percentage of prewash weight in Table 2. The weight percentage values in Table 2 are normalized based on the final weight of the fabric after 60 minutes of drying.

TABLE 2

| | | Weight of Fabric Swatches as Percentage of Final Weight | | | |
|---|---|---|---|---|---|
| Sample | Fabric Swatch Sample/Wash process | % of original wt, before drying | % of original wt, after 20 min drying | % of original wt, after 40 min drying | % of original wt, after 60 min drying |
| 3A | 1-untreated | 166.6 | 135.2 | 114.0 | 100 |
| 3B | 1-conventional resin | 136.1 | 108.1 | 101.4 | 100 |
| 3C | 1-inventive | 125.2 | 102.1 | 100.7 | 100 |
| 3D | 2-untreated | 129.2 | 102.6 | 100.5 | 100 |
| 3E | 2-conventional resin | 128.3 | 101.5 | 100.4 | 100 |
| 3F | 2-inventive | 129.1 | 101.5 | 100.1 | 100 |

**[0056]** As in Example 2, the fabric samples 3C and 3F of this invention exhibit reduced drying times as compared with the untreated fabric samples 3A and 3D. The reductions in drying times exhibited by the fabric samples according to the present invention are particularly evident in the rayon/flax samples.

EXAMPLE 4

**[0057]** In this example, a fabric swatch comprising 100% cotton jersy knit is provided with a formaldehyde crosslinking treatment in accordance with the invention and the general process described in Example 1 wherein the aqueous solution comprises about 5% formalin, based on the weight of the fabric. The fabric swatch sample, an untreated control fabric swatch sample and an untreated, mechanically finished fabric swatch sample are washed in a home washer of the type typically found in the United States and then subjected to tumble drying in a home dryer. During the drying processes, the processes are interrupted and the fabric samples are weighed to determine their weight relative to the respective fabric sample swatches prior to washing. The results are set forth in Table 3.

TABLE 3

| Sample | Fabric Swatch Sample | % of original wt, before drying | % of original wt, after 5 min drying | % of original wt, after 10 min drying | % of original wt, after 15 min drying | % of original wt, after 20 min drying |
|---|---|---|---|---|---|---|
| 4A | Treated | 194 | 174 | 145.8 | 109.2 | 105.5 |
| 4B | Untreated Control | 223 | 197 | 170 | 112.5 | 97.7 |
| 4C | Mechanically Finished | 234 | 202.5 | 171 | 116 | 98 |

**[0058]** The results set forth in Table 3 demonstrate that the treated fabric sample 4A according to the invention contains less water prior to any drying and dries more quickly as compared with the untreated fabric sample 4B or the untreated mechanically finished sample 4C.

**[0059]** The treated fabric sample 4A and untreated control fabric sample 4B are also evaluated for water retention according to ASTM 2402-94. The treated fabric sample 4A exhibits a water retention of 67.4% while the untreated control fabric sample 4B exhibits a water retention of 96.5%.

EXAMPLE 5

**[0060]** In this example, various fabrics are provided with a formaldehyde crosslinking treatment in accordance with the invention and the general process described in Example 1 wherein the aqueous solution comprises an amount of formalin as set forth in Table 4, based on the weight of the fabric. The fabric samples and conventional resin-treated samples of the fabrics are washed in a home washer of the type typically found in the United States and then subjected to tumble drying in a home dryer. During the drying processes, the processes are interrupted and the various fabric samples are weighed to determine their weight relative to the respective fabric sample swatches prior to washing. The fabric samples are also evaluated for water retention according to ASTM 2402-94. The results are set forth in Table 4.

TABLE 4

| | | Water Retention and Weight of Fabric Swatch as Percentage of Prewash Weight | | | | |
|---|---|---|---|---|---|---|
| Sample | Fabric Type/ Treatment | Percent Water Retention | % of original wt, before drying | % of original wt, after 5 min drying | % of original wt,after 10 min drying | % of original wt,after 15 min drying |
| 5A | Viscose/ Formalin (20%) | 65.1 | 150 | 129 | 102 | 99 |
| 5B | Viscose/ Resin | 77.8 | 184 | 160 | 122 | 100 |

TABLE 4-continued

Water Retention and Weight of Fabric Swatch as Percentage of Prewash Weight

| Sample | Fabric Type/ Treatment | Percent Water Retention | % of original wt, before drying | % of original wt, after 5 min drying | % of original wt,after 10 min drying | % of original wt,after 15 min drying |
|---|---|---|---|---|---|---|
| 5C | Proviscose/ Formalin (20%) | 58.1 | 156 | 127 | 104 | 101 |
| 5D | Proviscose/ Resin | 85.3 | 175 | 154 | 116 | 99 |
| 5E | 50/50 Cotton/Modal/ Formalin (20%) | 56.4 | ** | ** | ** | ** |
| 5F | 50/50 Cotton/Modal/ Resin | 67.0 | ** | ** | ** | ** |
| 5G | Modal/Formalin (20%) | 57.2 | 151 | 125 | 103 | 101 |
| 5H | Modal/ Resin | 70.6 | 159 | 140 | 108 | 100 |
| 5I | Lyocell/Formalin (18%) | 55.5 | ** | ** | ** | ** |
| 5K | 55/45 Lyocell/ Polyester/ Formalin (18%) | 51.1 | ** | ** | ** | ** |
| 5L | 55/45 Lyocell/ Polyester/ Resin | 43.9 | ** | ** | ** | ** |
| 5M | 75/25 Rayon/ Polyester/ Formalin (18%) | 65.5 | 175 | 161 | 134 | 101 |
| 5N | 75/25 Rayon/ Polyester/ Resin | 108.2 | 213 | 191 | 159 | 109 |

**Drying Times Not Measured

**[0061]** The results set forth in Table demonstrate that the treated fabric samples 5A, 5C, 5E, 5G, 5I, 5K and 5M according to the invention retain less water and/or contain less water prior to any drying and dry more quickly as compared with the resin-treated fabric samples 5B, 5D, 5F, 5H, 5J, 5L and 5M.

**[0062]** The examples and specific embodiments set forth herein are for illustrative purposes only and are not intended to limit the scope of the methods and fabrics of the invention. Additional methods and fabrics within the scope of the claimed invention will be apparent to one of ordinary skill in the art in view of the teachings set forth herein.

What is claimed is:

**1**. A method for reducing the drying time of fabric, comprising treating the fabric with a treatment composition comprising formaldehyde, catalyst for crosslinking the formaldehyde with natural fibers in the fabric, and silicone elastomer or a precursor thereof, and heating the treated fabric to effect crosslinking of the formaldehyde.

**2**. A method according to claim 1, wherein the fabric comprises at least about 50% by weight of cellulose fibers.

**3**. A method according to claim 1, wherein the treatment composition consists essentially of formaldehyde, catalyst and silicone elastomer or a precursor thereof.

**4**. A method according to claim 1, wherein the treatment composition is free of aminoplast resin.

**5**. A method according to claim 1, wherein the treatment composition comprises a silicone elastomer precursor.

**6**. A method for reducing the drying time of fabric while providing the fabric with good water absorbency and durable press properties, comprising treating the fabric with a treatment composition comprising formaldehyde, catalyst for crosslinking the formaldehyde with natural fibers in the fabric, and silicone elastomer or a precursor thereof, and heating the treated fabric to effect crosslinking of the formaldehyde.

**7**. A method according to claim 6, wherein the resulting fabric exhibits a water absorbency time of less than about 100 seconds as measured according to AATCC Method 79-1995 after the fabric has been aqueous laundered at least one time, a durable press value of at least about 3 after the fabric has been aqueous laundered at least one time, and/or a length shrinkage and a width shrinkage of less than about 5% each after the fabric has been aqueous laundered one time.

**8**. A method for reducing the drying time of fabric while providing the fabric with good water absorbency and shrinkage resistance properties, comprising treating the fabric with a treatment composition comprising formaldehyde, catalyst for crosslinking the formaldehyde with natural fibers in the fabric, and silicone elastomer or a precursor thereof, and heating the treated fabric to effect crosslinking of the formaldehyde.

**9**. A method according to claim 8, wherein the fabric comprises at least about 50% by weight of rayon fibers.

**10**. A method according to claim 8, wherein the treatment composition consists essentially of formaldehyde, catalyst and silicone elastomer or a precursor thereof.

**11**. A method according to claim 8, wherein the treatment composition is free of aminoplast resin.

**12**. A method according to claim 8, wherein the treatment composition comprises a silicone elastomer precursor.

**13**. A method according to claim 16, wherein the resulting fabric exhibits a water absorbency time of less than about 100 seconds as measured according to AATCC Method 79-1995 after the fabric has been aqueous laundered at least one time, a durable press value of at least about 3 after the fabric has been aqueous laundered at least one time, and/or a length shrinkage and a width shrinkage of less than about 5% each after the fabric has been aqueous laundered one time.

**14**. A method of reducing the drying time of fabric, comprising crosslinking cellulose in the fabric with formaldehyde and providing the fabric with a silicone elastomer.

**15**. A method for reducing the drying time of fabric, comprising treating the fabric with a treatment composition comprising formaldehyde and catalyst for crosslinking the formaldehyde with natural fibers in the fabric, treating the fabric with silicone elastomer or a precursor thereof, and heating the treated fabric to effect crosslinking of the formaldehyde.

**16**. Fabric comprising natural fibers, having a crosslinked formaldehyde treatment and being provided with a silicone elastomer, wherein the fabric exhibits a reduced drying time, wherein the fabric does not comprise 100% cotton.

**17**. Fabric according to claim 16, wherein the fabric exhibits a water absorbency time of less than about 100 seconds as measured according to AATCC Method 79-1995 after the fabric has been aqueous laundered at least one time, a length shrinkage and a width shrinkage of less than about 5% each after the fabric has been aqueous laundered at least one time, and/or a durable press value of at least about 3 after the fabric has been aqueous laundered at least one time.

**18**. Fabric comprising rayon fibers and exhibiting a reduced drying time.

**19**. Fabric according to claim 18, wherein the fabric exhibits a water absorbency time of less than about 100 seconds as measured according to AATCC Method 79-1995 after the fabric has been aqueous laundered at least one time, a length shrinkage and a width shrinkage of less than about 5% each after the fabric has been aqueous laundered at least one time, and/or a durable press value of at least about 3 after the fabric has been aqueous laundered at least one time.

* * * * *