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(54) Title: METHOD FOR TREATING FABRICS

(57) Abstract: A method of treating wet or dry fabrics in a dryer the method comprises the steps of placing the fabrics into the dryer, delivering a liquid composition onto the fabrics and drying the fabrics, the composition comprising a solvent and active ingredients wherein the active ingredients have a maximum stickiness of about 2500 Force (g) as measured under the conditions defined herein.

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METHOD FOR TREATING FABRICS

TECHNICAL FIELD

The present invention is in the field of fabric treatment. In particular, it relates to a method of treating fabrics in a dyer comprising the step of delivering a composition onto the fabrics, the composition comprising a solvent and low stickiness active ingredients.

BACKGROUND OF THE INVENTION

Traditionally, tumble dryers have been used exclusively to dry wet items. Tumble dryers can also be used to treat fabrics. Treatments include refreshment, perfuming, softening and conditioning of the fabrics. Treatments of fabrics are usually performed in the presence of compositions especially designed to be used in a dryer.

It has been found that compositions for use in a tumble dryer can contribute to the build up of lint. This lint build up is especially acute in cases in which the composition is sprayed into the dryer. The small droplets of the spray can be carried by the air flow in the dryer, the droplets would eventually collide with parts of the dryer making the surfaces of the dryer sticky. Lint produced during the tumbling of the fabrics would stick to the now sticky surfaces of the dryer. This phenomenon can occur on the walls of the dryer, air duct, filter, filter guards and fan. The lint build up would cover the body of the tumble dryer and it could block internal parts, such as air ducts and filters, impairing the efficiency of the tumble dryer. An additional problem found with existing compositions is that the compositions stick to parts of the dryer and thereby reduce the amount of treatment composition delivered to the fabrics.

In view of the above problems there is need to provide a composition that does not give rise to lint build up in a tumble dryer and which provides for an optimised use of the composition.

SUMMARY OF THE INVENTION

The present invention is directed to a method of treating fabrics in a dryer. The method is suitable for the treatment of wet and dry fabrics. The method comprises the steps of placing fabrics into the dryer, applying a liquid composition onto the load and drying the fabrics. The composition can be delivered onto the load before, during and/or after the drying of the fabrics. The composition comprises a solvent and active ingredients. The composition does not become sticky during use, this avoids lint build up and optimizes the amount of active ingredients that goes onto the fabrics.

The solvent of the composition of the invention evaporates during the drying step and the active ingredients deposit onto the fabrics. The active ingredients of the composition are such that they do not become sticky even when subjected to the high temperatures found in a dryer.

At least 90%, preferably 95% and especially 98% of the solvent is evaporated when 100 ml of the composition are placed in an open container (circular glass beaker – radius 4cm, depth 8cm) and the container is placed in an oven at 90°C for 24 hours. The composition of the method of the invention preferably comprises from about 20 to about 99% by weight of the composition, more preferably from about 30 to about 98% by weight of the composition of solvent. Preferred solvent for use herein is water.

The stickiness of the active ingredients is measured by evaporating the solvent of the composition to leave concentrated samples. The concentrated samples are rehydrated and the stickiness of 0.1g of the sample is measured in a texture analyser as explained in more details herein below.

The active ingredients do not go through a sticky phase during or after the solvent has being evaporated in an oven at 90°C for 24 hour. The resulting concentrated composition is rehydrated and left for 4 hours, the active ingredients are in the form of an oily liquid. The conditions described herein below are typically more stressed that those found in a tumble dryer, thus it can be concluded that the active ingredients do not go though a sticky phase during the drying process in the dryer.

The actives ingredients (i.e., the combination of all the single active ingredients) have a maximum stickiness of about 2500 Force (g), preferably about 2000, more preferably about 1600 and especially about 1400 Force (g). Preferably each single active ingredient has a maximum stickiness of about 2800 Force (g), more preferably about 2500, even more preferably about 2000 and especially below 1800 Force (g).

In a preferred embodiment, the composition of the method of the invention is delivered in the form of spray. This contributes to uniform distribution of the composition onto the treated fabrics.

The method of the invention is suitable for treating dry fabrics. For example, fabrics that are not dirty and only need to be refreshed. Other treatments which are suitable applied according to the method of the invention include conditioning and softening of fabrics.

The method of the invention is also suitable for treating wet fabrics. The treatment takes place concurrently to the drying of the fabrics. The composition can be delivered before or during the drying.

Any type of treatment composition, provided that fulfil the claimed requirements, can be used herein. Especially preferred for use herein are perfume compositions. Perfume compositions comprise more than 10%, preferably more than 20% of weight of the active ingredients of perfume. Preferably, the perfume composition comprises a high level of perfume ingredients of low volatility to avoid perfume evaporation during the drying.

Suitable active ingredients for use in the composition of the method of the invention include any ingredient capable of conferring a benefit to fabrics, it also includes any ingredient that contribute to the stability of the composition, such as for example preservatives and ingredients that make the composition fabric substantive. Preferred active ingredients for use in the composition of the method of the invention include perfume, surfactant and preservative.

The composition is free of any ingredient that becomes sticky under the conditions specified herein below. For example the composition is free from cyclodextrins (material widely used in fabric treatment perfume compositions).

DETAILED DESCRIPTION OF THE INVENTION

The present invention envisages a method of treating wet or dry fabrics in a dryer, the method includes the delivery of a composition onto the fabrics and drying of the fabrics (even if the fabrics are initially dry they will become wet after the application of the composition). The composition comprises a solvent and actives ingredients with low stickiness. The method of the invention avoids lint build up and allows optimum deposition of the active ingredients on the fabrics.

As used herein, the articles “a” and “an”, when used in a claim, are understood to mean one or more of the material that is claimed or described.

Solvent

Preferably the compositions for use in the method of the invention are aqueous compositions. Water is the main liquid carrier of the active ingredients due to its low cost, availability, safety, and environmental compatibility. As used herein, water can be distilled, deionized, or tap water. Water not only serves as a liquid carrier for the active ingredients, but it can also provide some odor controlling effect of its own. It has been discovered that the intensity of odor generated by some polar, low molecular weight organic amines, acids, and mercaptans is reduced when the odor-contaminated fabrics are treated with an aqueous solution. Water is also very useful for fabric wrinkle removal or reduction. Without wishing to be bound by theory, it is believed that water breaks many intra-fiber and inter-fiber hydrogen bonds that keep the fabric in a wrinkle state. It also swells, lubricates and relaxes the fibers to help the wrinkle removal process.

Optionally, in addition to water, the solvent can contain a low molecular weight organic solvent that is highly soluble in water, e.g., ethanol, propanol, isopropanol, and the like, and mixtures thereof. Low molecular weight alcohols can help the treated fabric articles to dry faster and also provide some antimicrobial benefit. The optional water soluble low molecular weight solvent can be used at a level of up to about 50%, typically from about 0.1% to about 20%, preferably from about 0.2% to about 15%, more preferably from about 0.5% to about 10%, by weight of the total solvent. Factors that need to be considered when a high level of solvent is used in the composition are odor, flammability, and environment impact.

Active ingredients

The actives ingredients of the composition have a maximum stickiness (as measured under the conditions described herein) of about 2500 Force (g), preferably about 2000, more preferably about 1600 and especially about 1400 Force (g). Preferably each single active ingredient has a maximum stickiness of about 2800 Force (g), more preferably about 2500, even more preferably about 2000 and especially below 1800 Force (g).

Stickiness measurement of the active ingredients

Stickiness is measured by using a texture analyser.

A 100 ml sample of a composition is placed in an open container (circular glass beaker – radius 4cm, depth 8cm) in an oven at 90°C for 24hours. This removes most of the solvent from the composition and leaves a concentrated sample of the active ingredients. This process of evaporation of the solvent from the sample is similar to that which would occur in a tumble drier during drying. The concentrated sample is then removed from the oven and allowed to cool to room temperature. The sample remains as an oily liquid when the solvent is evaporated and after the solvent is evaporated. Samples which go through a sticky phase as they solidify are outside the scope of the invention.

The sample is re-hydrated with 2 ml of distilled water and stirred with a small spatula until a uniform concentrated solution is formed. The sample is left to rest for an hour. A 0.1g of this sample is weighed into a well of a polycarbonate slide. The well is circular and has a depth of 4mm. The well is 2.5mm wider than probe and in such a position that the probe is centre to the well when the plate is clamped into place allowing equal gap around all sides. The stickiness measurement is then conducted on the sample using a Texture Analyser.

The Texture Analyser for use herein is a TA-X2, with an aluminium probe. The probe has a smooth flat circular end with a diameter of 1.25 cm. The sample is placed in a polycarbonate slide having a 4mm deep circular well lathed into it. This well is 2.5mm wider than the probe (total diameter of about 1.5cm) and in such a position that the probe is centred to the well when the plate is clamped into place.

The following parameters are used:
Initial probe height – 10 mm
Speed at which the probe is lowered – 1mm/s
Apply force – 1000g
Hold – 60sec
Speed at which the probe is raised– 0.5mm/s to a high of 10mm.

The polycarbonate slide is placed into the holder and clamped into place so that the probe is centred to the well containing the sample. The Texture Analyser program is then run on the sample and the force (in grams) required to separate the two surfaces is recorded. This force (in grams) is the stickiness of the active ingredients.

The stickiness of an individual active component is measured by placing the component in neat form in the texture analyser.

Perfume

A preferred active ingredient for use herein is a perfume. As used herein, "perfume" means a mixture of perfume materials. The composition for use in the method of the invention may comprise at least about 0.005 wt. %, preferably from about 0.005 wt. % to about 10 wt% more preferably from about 0.1 wt. % to about 2 wt. % of a perfume. The perfume preferably comprises at least about 30 wt.%, preferably from about 35 wt % to about 100 wt. %, more preferably from about 40 wt % to about 100 wt.% and even more preferably from about 40 wt % to about 70 wt.% of a perfume material having a boiling point of less than or equal to about 250 °C at 1 atmosphere.

Examples of suitable perfume materials that have a boiling point of less than or equal to 250°C at 1 atmosphere, include but are not limited, to: Allyl cyclohexanepropionate, Allyl heptanoate, Allyl caproate, Allo-ocimene, Amyl acetate (n-pentyl acetate), Amyl propionate, Acetanisole, p-Anisaldehyde, Anisole, trans-Anethole, Benzaldehyde (Benezenecarboxaldehyde), Benzylacetate, Benzyl butyrate, Benzyl acetone, Benzyl alcohol, Benzyl formate, Benzyl propionate, Beta-gamma-hexanol (2-hexen-1-ol), (+)-Camphor, Cadinene, Camphene, Carvacrol, Cis-3-hexenyl tiglate, (+)-Carvone, Citronellol, Citronellyl acetate, Citronellyl nitrile, Citronellyl propionate, Cyclohexylethyl acetate, L-Carvone, Cinnamic alcohol, Cinnamyl formate, cis-Jasmone, Cis-3-hexenyl acetate, Citral, Cumic alcohol, Cuminaldehyde, 2,4-dimethyl-3-cyclohexene-1-carboxaldehyde, Dimethyl benzyl carbinol, Dimethyl benzyl carbinyl acetate, Decyl Aldehyde (Capraldehyde), Dihydromyrcenol, Dihydromyrcenyl acetate, 3,7-Dimethyl-1-octanol, Diphenyloxide, Ethyl acetate, Ethyl acetoacetate, Ethyl amyl ketone, Ethyl benzoate, Ethyl butanoate, 3-Nonanone (ethyl hexyl ketone), Ethyl phenylacetate, Eucalyptol, Eugenol, Fenchyl alcohol, Fenchyl Acetate (1,3,3-trimethyl-2-norbornanyl acetate), tricyclodecenyl acetate, tricyclodecenyl propionate, Gamma-nonalactone, Geranyl acetate, Geranyl formate, Geranyl nitrile, Trans-Geraniol, cis-3-Hexenyl isobutyrate, Hexyl neopentanoate, Hexyl tiglate, Cis-3-Hexen-1-ol/Leaf alcohol, Hexyl acetate, Hexyl formate, Hydratopic alcohol, Hydroxycitronellal, Alpha-Ionone, Isobornyl acetate, Isobutyl benzoate, Isononyl acetate, Isononyl alcohol (3,5,5-trimethyl-1-hexanol), Isopulegyl acetate, Indole (2,3-benzopyrrole), Isoamyl alcohol, Isopropyl phenylacetate, Isopulegol, Isoquinoline (Benzopyridine), Lauraldehyde, d-Limonene, Linalyl acetate, 2,3-dimethyl-3-cyclohexene-1-carboxaldehyde, Linalool, Linalool oxide, Linalyl formate, Menthone, (-)-L-Menthyl acetate, Methyl Chavicol (Estragole), Methyl n-nonyl acetaldehyde, Methyl octyl acetaldehyde, Beta-Myrcene, 4-Methylacetophenone, Methyl pentyl ketone, Methyl anthranilate, Methyl benzoate, Methyl Phenyl Carbinyl Acetate (alpha-methylbenzyl acetate), Methyl eugenol (eugenol methyl ether), Methyl Heptenone (6-Methyl-5-hepten-2-one), Methyl Heptine Carbonate (methyl 2-octynoate), Methyl heptyl ketone, Methyl hexyl ketone, Methyl salicylate, Dimethyl anthranilate, Neryl acetate, Nonyl acetate, Nonaldehyde, Nerol, Delta-Nonalactone, Gamma-Octalactone, 2-octanol, Octyl aldehyde (caprylic aldehyde), p-Cresol, p-Cymene, Alpha-Pinene, Beta-Pinene, p-Cresyl methyl ether, 2-phenoxyethanol, Phenylacetaldehyde, 2-Phenylethyl acetate, Phenylethyl alcohol, Phenyl ethyl dimethyl carbinol (benzyl-tert-butanol), Prenyl acetate, Propyl butanoate, (+)-Pulegone, methyl iso butenyl tetrahydro pyran, Safrole, 4-terpinenol, Alpha-Terpinene, Gamma-Terpinene, Alpha-Terpinyl acetate, Tetrahydrolinalool, Tetrahydromyrcenol, Terpinolene (alpha-Terpineol), 2-Undecenal, 1,2-dimethoxybenzene, phenylacetaldehyde dimethyl acetal, o-t-butylcyclohexyl acetate, 4-tert-butylcyclohexyl acetate.

The composition for use in the method of the invention can include perfume ingredients that have a boiling point of less than or equal to 250 °C at 1 atmosphere, including but are not limited, to: Allyl caproate, Amyl acetate (n-pentyl acetate), Amyl propionate, p-Anisaldehyde, Anisole, Benzaldehyde (Benezenecarboxaldehyde), Benzylacetate, Benzyl acetone, Benzyl alcohol, Benzyl formate, (+)-Camphor, (+)-Carvone, L-Carvone, Cinnamic alcohol, Cis-3-hexenyl acetate, Citral (Neral), 2,4-dimethyl-3-cyclohexene-1-carboxaldehyde, Dimethyl benzyl carbinol, Dimethyl benzyl carbinyl acetate, Ethyl acetate, Ethyl acetoacetate, Ethyl amyl ketone, Ethyl benzoate, Eucalyptol, Eugenol, Fenchyl alcohol, tricyclodecenyl acetate, tricyclodecenyl propionate, Gamma-nonalactone, Trans-Geraniol, Cis-3-Hexen-1-ol/Leaf alcohol, Hexyl acetate, Hydroxycitronellal, Ligustral (2,3-dimethyl-3-cyclohexene-1-carboxaldehyde), Linalool, Linalool oxide, Linalyl formate, Menthone, 4-Methylacetophenone, Methyl anthranilate, Methyl benzoate, Methyl Phenyl Carbinyl Acetate (alpha-methylbenzyl acetate), Methyl eugenol (eugenol methyl ether), Methyl Heptine Carbonate (methyl 2-octynoate), Methyl heptyl ketone, Methyl hexyl ketone, Methyl salicylate, Dimethyl anthranilate, Nerol, Delta-Nonalactone, Gamma-Octalactone, Octyl aldehyde (caprylic aldehyde), p-Cresyl methyl ether, Phenylacetaldehyde, Phenylethyl alcohol, Phenyl ethyl dimethyl carbinol (benzyl-tert-butanol), Prenyl acetate, methyl iso butenyl tetrahydro pyran, Terpinolene (alpha-Terpineol), Allo-ocimene, Allyl cyclohexanepropionate, Allyl heptanoate, trans-Anethole, Benzyl butyrate, Camphene, Citronellol, Citronellyl acetate, Citronellyl nitrile, Decyl Aldehyde (Capraldehyde), Dihydromyrcenol, Dihydromyrcenyl acetate, 3,7-Dimethyl-1-octanol, Diphenyloxide, Fenchyl Acetate (1,3,3-trimethyl-2-norbornanyl acetate), Geranyl acetate, Geranyl formate, Geranyl nitrile, cis-3-Hexenyl isobutyrate, Alpha-Ionone, Isobornyl acetate, Lauraldehyde, d-Limonene, Linalyl acetate, Methyl Chavicol (Estragole), Methyl n-nonyl acetaldehyde, Methyl octyl acetaldehyde, Beta-Myrcene, Nonaldehyde, p-Cymene, Alpha-Pinene, Beta-Pinene, Alpha-Terpinene, Gamma-Terpinene, Alpha-Terpinyl acetate, Tetrahydrolinalool, Tetrahydromyrcenol, 2-Undecenal, o-t-butylcyclohexyl acetate, 4-tert-butylcyclohexyl acetate.

The aforementioned perfume materials may be obtained from one or more of the following perfume material suppliers Firmenich (Geneva, Switzerland), Givaudan (Argenteuil, France), IFF (Hazlet, NJ), Quest (Mount Olive, NJ), Bedoukian (Danbury, CT), Sigma Aldrich (St.Louis, MO), Millennium Specialty Chemicals (Olympia Fields, IL), Polarone International (Jersey City, NJ), Fragrance Resources (Keyport, NJ), and Aroma & Flavor Specialties (Danbury, CT).

Surfactant

In a preferred embodiment, the composition herein contains from about 0.005% to 1%, preferably from about 0.01% to about 0.5% and more preferably from a about 0.03% to about 0.3% by weight of the composition of a surfactant. Preferred surfactants for use herein include siloxane surfactants. Surfactant provides a low surface tension that permits the composition to spread readily and more uniformly on hydrophobic surfaces, such as polyester and nylon. It has been found that perfume compositions containing surfactant spreads satisfactorily on fabric articles. The spreading of the composition also allows it to dry faster, making the drying process more efficient. Furthermore, a composition containing a surfactant can penetrate hydrophobic, oily soil better for improved malodor control. The surfactant is also needed in a composition herein as a dispersing agent, an emulsifying agent and preferably as a solubilizing agent. The surfactant for use herein should be compatible with other components in the composition and not alter the character of the perfume.

Suitable siloxane surfactants for use herein are the polyalkyleneoxide polysiloxanes having a dimethyl polysiloxane hydrophobic moiety and one or more hydrophilic polyalkylene side chains and have the general formula:

$$R^1\text{—}(CH_3)_2SiO\text{—}[(CH_3)_2SiO]_a\text{—}[(CH_3)(R^1)SiO]_b\text{—}Si(CH_3)_2\text{—}R^1$$

wherein a + b are from about 1 to about 50, alternatively from about 3 to about 30, alternatively from about 10 to about 25, and each R^1 is the same or different and is selected from the group consisting of methyl and a poly(ethyleneoxide/propyleneoxide) copolymer group having the general formula:

$$-(CH_2)_n\,O(C_2\,H_4\,O)_c\,(C_3\,H_6\,O)_d\,R^2$$

with at least one R^1 being a poly(ethyleneoxide/propyleneoxide) copolymer group, and wherein n is 3 or 4, alternatively 3; total c (for all polyalkyleneoxy side groups) has a value of from about 1 to about 100, alternatively from about 6 to about 100; total d is from 0 to about 14, alternatively from 0 to about 3; and alternatively d is 0; total c+d has a value of from about 5 to about 150, alternatively from about 9 to about 100 and each R^2 is the same or different and is selected from the group consisting of hydrogen, an alkyl having 1 to 4 carbon atoms, and an acetyl group, alternatively hydrogen and methyl group.

Examples of this type of surfactant are the Silwet® Hydrostable 68, 611, and 212 available Momentive Performance Materials. Other representative Silwet surfactants are as follows.

Name	Average MW	Average a+b	Average total c
L-7608	600	1	9
L-7607	1,000	2	17
L-77	600	1	9
L-7605	6,000	20	99
L-7604	4,000	21	53
L-7600	4,000	11	68
L-7657	5,000	20	76
L-7602	3,000	20	29

The molecular weight of the polyalkyleneoxy group (R^1) is less than or equal to about 10,000. Alternatively, the molecular weight of the polyalkyleneoxy group is less than or equal to about 8,000, and alternatively ranges from about 300 to about 5,000. Thus, the values of c and d can be those numbers which provide molecular weights within these ranges. However, the number of ethyleneoxy units ($-C_2H_4O$) in the polyether chain (R^1) must be sufficient to render the polyalkyleneoxide polysiloxane water dispersible or water soluble. If propyleneoxy groups are present in the polyalkylenoxy chain, they can be distributed randomly in the chain or exist as blocks. Besides surface activity, polyalkyleneoxide polysiloxane surfactants can also provide other benefits, such as antistatic benefits, lubricity and softness to fabrics.

The preparation of polyalkyleneoxide polysiloxanes is well known in the art. Polyalkyleneoxide polysiloxanes suitable for the composition of the present invention can be prepared according to the procedure set forth in U.S. Pat. No. 3,299,112, incorporated herein by reference.

Preservative

The composition can comprise from about 0.0001% to about 2% of antimicrobial preservative. Preferably from about 0.0002% to about 1%, more preferably from about 0.0003% to about 0.5%, most preferably from about 0.0004% to about 0.1%, by weight of the composition.

The preservative keeps the composition free from microorganisms and subsequent microbial growth that can result in unsightly and/or malodorous issues. The preservative is effective for inhibiting and/or regulating microbial growth in order to increase storage stability of the perfume composition. Preferably the preservative is water-soluble and is solubilised in the composition of the method of the invention.

It is preferable to use a broad spectrum preservative, e.g., one that is effective on both bacteria (both gram positive and gram negative) and fungi. A limited spectrum preservative, e.g., one that is only effective on a single group of microorganisms, e.g., fungi, can be used in combination with a broad spectrum preservative or other limited spectrum preservatives with complimentary and/or supplementary activity. A mixture of broad spectrum preservatives can also be used. In some cases where a specific group of microbial contaminants is problematic (such as Gram negatives), aminocarboxylate chelators (also referred herein as chelants) may be used alone or as potentiators in conjunction with other preservatives. These chelators which include, e.g., ethylenediaminetetraacetic acid (EDTA), hydroxyethylenediaminetriacetic acid, diethylenetriaminepentaacetic acid, and other aminocarboxylate chelators, and mixtures thereof, and their salts, and mixtures thereof, can increase preservative effectiveness against Gram-negative bacteria, especially *Pseudomonas* species.

Antimicrobial preservatives useful in the present invention include biocidal compounds, i.e., substances that kill microorganisms, or biostatic compounds, i.e., substances that inhibit and/or regulate the growth of microorganisms.

Preferred antimicrobial preservatives are those that are water-soluble and are effective at low levels. Water-soluble preservatives useful in the present invention are those that have a solubility in water of at least about 0.3 g per 100 ml of water, i.e., greater than about 0.3% at room temperature, preferably greater than about 0.5% at room temperature.

The preservative can be any organic preservative material which will not cause damage to fabric appearance, e.g., discoloration, coloration, bleaching. The water-soluble preservatives of the composition of the invention are selected from organic sulfur compounds, halogenated compounds, cyclic organic nitrogen compounds, low molecular weight aldehydes, quaternary ammonium compounds, dehydroacetic acid, phenyl and phenolic compounds, parabens and mixtures thereof. Preferably the composition of the invention is free from quaternary ammonium compounds. Due to the nature of these species aggregates may form which can cause blockages in the delivery system or potential build up within the appliance itself.

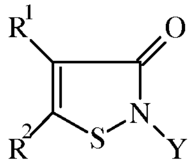
The following are preservatives for use in the composition of the present invention.

(1). Organic Sulfur Compounds

Preferred water-soluble preservatives for use in the present invention are organic sulfur compounds. Some non-limiting examples of organic sulfur compounds suitable for use in the present invention are:

(a) 3-Isothiazolone Compounds

A preferred preservative is an antimicrobial, organic preservative containing 3-isothiazolone groups having the formula:



wherein

Y is an unsubstituted alkyl, alkenyl, or alkynyl group of from about 1 to about 18 carbon atoms, an unsubstituted or substituted cycloalkyl group having from about a 3 to about a 6 carbon ring and up to 12 carbon atoms, an unsubstituted or substituted aralkyl group of up to about 10 carbon atoms, or an unsubstituted or substituted aryl group of up to about 10 carbon atoms;

R^1 is hydrogen, halogen, or a (C_1-C_4) alkyl group; and

R^2 is hydrogen, halogen, or a (C_1-C_4) alkyl group.

Preferably, when Y is methyl or ethyl, R^1 and R^2 should not both be hydrogen. Salts of these compounds formed by reacting the compound with acids such as hydrochloric, nitric, sulfuric, etc. are also suitable.

This class of compounds is disclosed in U.S. Pat. No. 4,265,899, Lewis et al., issued May 5, 1981, and incorporated herein by reference. Examples of said compounds are: 5-chloro-2-methyl-4-isothiazolin-3-

one; 2-n-butyl-3-isothiazolone; 2-benzyl-3-isothiazolone; 2-phenyl-3-isothiazolone, 2-methyl-4,5-dichloroisothiazolone; ; 5-chloro-2-methyl-3-isothiazolone; 2-methyl-4-isothiazolin-3-one; and mixtures thereof. A preferred preservative is a water-soluble mixture of 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one, more preferably a mixture of about 77% 5-chloro-2-methyl-4-isothiazolin-3-one and about 23% 2-methyl-4-isothiazolin-3-one, a broad spectrum preservative available as a 1.5% aqueous solution under the trade name Kathon® CG by Rohm and Haas Company.

When Kathon® is used as the preservative in the present invention it is present at a level of from about 0.0001% to about 0.01%, preferably from about 0.0002% to about 0.005%, more preferably from about 0.0003% to about 0.003%, most preferably from about 0.0004% to about 0.002%, by weight of the composition.

Other isothiazolins include 1,2-benzisothiazolin-3-one, available under the trade name Proxel® products; and 2-methyl-4,5-trimethylene-4-isothiazolin-3-one, available under the trade name Promexal®. Both Proxel and Promexal are available from Zeneca. They have stability over a wide pH range (i.e., 4-12). Neither contain active halogen and are not formaldehyde releasing preservatives. Both Proxel and Promexal are effective against typical Gram negative and positive bacteria, fungi and yeasts when used at a level from about 0.001% to about 0.5%, preferably from about 0.005% to about 0.05%, and most preferably from about 0.01% to about 0.02% by weight of the usage composition.

(b) Sodium Pyrithione

Another preferred organic sulfur preservative is sodium pyrithione, with water solubility of about 50%. When sodium pyrithione is used as the preservative in the present invention it is typically present at a level of from about 0.0001% to about 0.01%, preferably from about 0.0002% to about 0.005%, more preferably from about 0.0003% to about 0.003%, by weight of the usage composition.

Mixtures of the preferred organic sulfur compounds can also be used as the preservative in the present invention.

(2). Halogenated Compounds

Preferred preservatives for use in the present invention are halogenated compounds. Some non-limiting examples of halogenated compounds suitable for use in the present invention are:

5-bromo-5-nitro-1,3-dioxane, available under the trade name Bronidox L® from Henkel. Bronidox L® has a solubility of about 0.46% in water. When Bronidox is used as the preservative in the present invention it is typically present at a level of from about 0.0005% to about 0.02%, preferably from about 0.001% to about 0.01%, by weight of the usage composition;

2-bromo-2-nitropropane-1,3-diol, available under the trade name Bronopol® from Inolex can be used as the preservative in the present invention. Bronopol has a solubility of about 25% in water. When Bronopol is used as the preservative in the present invention it is typically present at a level of from about 0.002% to about 0.1%, preferably from about 0.005% to about 0.05%, by weight of the usage composition;

1,1'-hexamethylene bis(5-(p-chlorophenyl)biguanide), commonly known as chlorhexidine, and its salts, e.g., with acetic and gluconic acids can be used as a preservative in the present invention. The digluconate salt is highly water-soluble, about 70% in water, and the diacetate salt has a solubility of about 1.8% in water. When chlorhexidine is used as the preservative in the present invention it is typically present at a level of from about 0.0001% to about 0.04%, preferably from about 0.0005% to about 0.01%, by weight of the usage composition.

1,1,1-Trichloro-2-methylpropan-2-ol, commonly known as chlorobutanol, with water solubility of about 0.8%; a typical effective level of chlorobutanol is from about 0.1% to about 0.5%, by weight of the usage composition.

4,4'- (Trimethylenedioxy)bis-(3-bromobenzamidine) diisethionate, or dibromopropamidine, with water solubility of about 50%; when dibromopropamidine is used as the preservative in the present invention it is typically present at a level of from about 0.0001% to about 0.05%, preferably from about 0.0005% to about 0.01% by weight of the usage composition.

Mixtures of the preferred halogenated compounds can also be used as the preservative in the present invention.

(3). Cyclic Organic Nitrogen Compounds

Preferred water-soluble preservatives for use in the present invention are cyclic organic nitrogen compounds. Some non-limiting examples of cyclic organic nitrogen compounds suitable for use in the present invention are:

(a) Imidazolidinedione Compounds

Preferred preservatives for use in the present invention are imidazolidione compounds. Some non-limiting examples of imidazolidinedione compounds suitable for use in the present invention are:

1,3-bis(hydroxymethyl)-5,5-dimethyl-2,4-imidazolidinedione, commonly known as dimethyloldimethylhydantoin, or DMDM hydantoin, available as, e.g., Glydant® from Lonza. DMDM hydantoin has a water solubility of more than 50% in water, and is mainly effective on bacteria. When DMDM hydantoin is used, it is preferable that it be used in combination with a broad spectrum preservative such as Kathon CG®, or formaldehyde. A preferred mixture is about a 95:5 DMDM hydantoin to 3-butyl-2-iodopropynylcarbamate mixture, available under the trade name Glydant Plus®

from Lonza. When Glydant Plus® is used as the preservative in the present invention, it is typically present at a level of from about 0.005% to about 0.2% by weight of the usage composition;

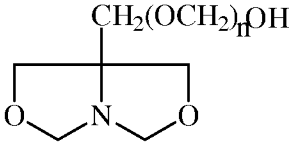
N-[1,3-bis(hydroxymethyl)2,5-dioxo-4-imidazolidinyl]-N,N'-bis(hydroxymethyl) urea, commonly known as diazolidinyl urea, available under the trade name Germall II® from Sutton Laboratories, Inc. (Sutton) can be used as the preservative in the present invention. When Germall II® is used as the preservative in the present invention, it is typically present at a level of from about 0.01% to about 0.1% by weight of the usage composition;

N,N''-methylenebis{N'-[1-(hydroxymethyl)-2,5-dioxo-4-imidazolidinyl]urea}, commonly known as imidazolidinyl urea, available, e.g., under the trade name Abiol® from 3V-Sigma, Unicide U-13® from Induchem, Germall 115® from (Sutton) can be used as the preservative in the present invention. When imidazolidinyl urea is used as the preservative, it is typically present at a level of from about 0.05% to about 0.2%, by weight of the usage composition.

Mixtures of the preferred imidazolidinedione compounds can also be used as the preservative in the present invention.

(b) Polymethoxy Bicyclic Oxazolidine

Another preferred water-soluble cyclic organic nitrogen preservative is polymethoxy bicyclic oxazolidine, having the general formula:



where n has a value of from about 0 to about 5, and is available under the trade name Nuosept® C from Hüls America. When Nuosept® C is used as the preservative, it is typically present at a level of from about 0.005% to about 0.1%, by weight of the usage composition.

Mixtures of the preferred cyclic organic nitrogen compounds can also be used as the preservative in the present invention.

(4). Low Molecular Weight Aldehydes

(a). Formaldehyde

A preferred preservative for use in the present invention is formaldehyde. Formaldehyde is a broad spectrum preservative which is normally available as formalin which is a 37% aqueous solution of formaldehyde. When formaldehyde is used as the preservative in the present invention, typical levels are from about 0.003% to about 0.2%, preferably from about 0.008% to about 0.1%. more preferably from about 0.01% to about 0.05%, by weight of the usage composition.

(b). Glutaraldehyde

A preferred preservative for use in the present invention is glutaraldehyde. Glutaraldehyde is a water-soluble, broad spectrum preservative commonly available as a 25% or a 50% solution in water. When glutaraldehyde is used as the preservative in the present invention it is typically present at a level of from about 0.005% to about 0.1%, preferably from about 0.01% to about 0.05%, by weight of the usage composition.

(5). Dehydroacetic Acid

A preferred preservative for use in the present invention is dehydroacetic acid. Dehydroacetic acid is a broad spectrum preservative preferably in the form of a sodium or a potassium salt so that it is water-soluble. This preservative acts more as a biostatic preservative than a biocidal preservative. When dehydroacetic acid is used as the preservative it is typically used at a level of from about 0.005% to about 0.2%, preferably from about 0.008% to about 0.1%, more preferably from about 0.01% to about 0.05%, by weight of the usage composition.

(6). Phenyl and Phenolic Compounds

Some non-limiting examples of phenyl and phenolic compounds suitable for use in the present invention are:

4,4'-diamidino-α,ω-diphenoxypropane diisethionate, commonly known as propamidine isethionate, with water solubility of about 16%; and 4,4'-diamidino-α,ω-diphenoxyhexane diisethionate, commonly known as hexamidine isethionate. Typical effective level of these salts is about 0.0002% to about 0.05% by weight of the usage composition.

Other examples are benzyl alcohol, with a water solubility of about 4%; 2-phenylethanol, with a water solubility of about 2%; and 2-phenoxyethanol, with a water solubility of about 2.67%; typical effective level of these phenyl and phenoxy alcohol is from about 0.1% to about 0.5%, by weight of the usage composition. Preferred for use herein is benzyl alcohol.

(7). Parabens

Short chain alkyl esters of p-hydroxybenzoic acid are commonly known as parabens. Preferred parabens include N-(4-chlorophenyl)-N'-(3,4-dichlorophenyl) urea, also known as 3,4,4'-trichlorocarbanilide or triclocarban; 2,4,4'-trichloro-2'-hydroxy diphenyl ether, commonly known as triclosan.

(8). Mixtures thereof

The preservatives of the present invention can be used in mixtures in order to control a broad range of microorganisms.

Additional ingredients

The composition herein may further contain one or more optional ingredients typically used in fabric care product category. Illustrative optional ingredients include, but are not limited to fabric wrinkle control agent, fabric softening agent, anti-static agent, chelating agent, insect and moth repelling agent, colorant and mixtures thereof. The total level of optional ingredients is low, preferably less than about 5%, or less than about 3%, or less than about 2%, by weight of the composition.

Optionally, the composition contains from about 0.1% to about 10%, or from about 0.5% to about 7%, or from about 1% to about 5%, by weight of a fabric wrinkle control agent, preferably selected from the group consisting of: silicone, shape retention polymer, hydrophilic plasticizer, lithium salt, and mixtures thereof. Silicone can be used herein to impart a lubricating property or increased gliding ability to fibers in fabric, particularly clothing. The preferred silicones have pendant alkyl groups having less than about 8, preferably less than about 6, carbon atoms, and do not have pendant aryl groups. Nonlimiting examples of useful silicones include noncurable silicones such as polydimethylsilicone and volatile silicones, and curable silicones such as aminosilicones and hydroxysilicones. Optionally, the composition can contain hydrophilic plasticizer to soften both the fabric fibers, especially cotton fibers. Examples of preferred hydrophilic plasticizers are short chain polyhydric alcohols, such as glycerol, ethylene glycol, propylene glycol, diethylene glycol, dipropylene glycol, sorbitol, erythritol or mixtures thereof, more preferably diethylene glycol, dipropylene glycol, ethylene glycol, propylene glycol and mixtures thereof. Lithium salts can be used in the composition to improve fabric wrinkle control performance. Non-limiting examples of lithium salts that are useful herein are lithium bromide, lithium bromide hydrate, lithium chloride, lithium chloride hydrate, lithium acetate, lithium acetate dihydrate, lithium lactate, lithium sulfate, lithium sulfate monohydrate, lithium tartrate, lithium bitartrate, and mixtures thereof.

Preferably, the composition is delivered onto the fabric in the form of a spray having droplets with mean droplet size of from about 100 microns to about 1400 microns, more preferably form about 200 microns to about 1300 microns, even more preferably from about 300 microns to about 1200 microns and especially from about 500 microns to about 1100 microns. It is also preferred that droplet size distribution is such that less than 10% of the droplets have a size of less than 50 microns and less than 10% have a size greater than 1600 microns. By “size” is herein meant the diameter of the droplets. This droplet size range contributes to good distribution of the composition and avoids streaking and staining of the fabrics.

A suitable instrument for measuring droplet size is the Malvern particle sizer manufactured by Malvern Instruments Ltd. of Framingham, Massachusetts.

The flowrate of the spray in the drum is preferably from about 0.5 to about 100 ml/minute, more preferably from about 1 to about 75 ml/minute, even more preferably from about 2 to about 50 ml/minute and especially from about 15 to about 25 ml/minute. One suitable method for determining flow rate is found in ASME/ANSI MFC-9M-1988, entitled "Measurement of Liquid Flow in Closed Conduits by Weighing Method".

Preferably, the linear velocity of the spray in the drum is from about 0.05 to about 2 m/second, more preferably from about 0. 1 to about 1 m/second. The length of the spray in the drum of the tumble dryer is from about 20% to about 95% of the length of the drum as measured along the rotational axis of the drum. One suitable method for determining linear velocity is by utilizing Laser Doppler Anemometry such as described in "Laser Doppler and Phase Doppler Measurement Techniques" part of the "Experimental Fluid Mechanics" series, written by Albrecht, H.E., Damaschke, N., Borys, M., and Tropea, C., 2003, XIV, 738, page 382.

The cone angle of the spray refers to the angle the spray forms as it is sprayed into the drum of the tumble dryer. The cone angle of the spray is about 35° to about 1 50° or about 40° to about 110° or about 50° to about 90°.

All the percentages given herein are weight basis unless otherwise stated.

Example

Table 1: Treating composition

Ingredient	Wt. %
Preservative[1]	0.02
Silwet 7600[2]	0.098
Basophor[3]	0.027
Perfume	0.200
Distilled Water	Up to 100

1: Koralone B-119 (1,2 benzisothiazolin 3-one) available from Rhom and Haas

2: Silicon surfactant available from Momentive

3: Surfactant available from BASF

The maximum stickiness of the exemplified treating composition is 1,200 Force (g). A fabric load is treated with 100 ml of the exemplified composition, the load is placed in a dryer with a spray delivery system. The composition provides excellent perfuming of the load and does not produce lint build up.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as “40 mm” is intended to mean “about 40 mm”.

What is claimed is:

1. A method of treating wet or dry fabrics in a dryer the method comprises the steps of placing the fabrics into the dryer, delivering a liquid composition onto the fabrics and drying the fabrics, the composition comprising a solvent and active ingredients wherein the active ingredients have a maximum stickiness of about 2500 Force (g) as measured under the conditions defined herein.

2. A method according to claim 1 wherein the active ingredients remain in liquid form during the drying.

3. A method according to any one of the preceding claims wherein the composition is delivered onto the fabrics in the form of spray.

4. A method according to one of the preceding claims wherein the composition comprises one or more active ingredients each having a maximum stickiness of about 2800 Force (g) as measured under the conditions defined herein.

5. A method according to any one of the preceding claims wherein one of the active ingredients is a perfume.

6. A method according to the preceding claim wherein the active ingredients comprise at least 50% by weight of perfume.

7. A method according to any of claim 5 or 6 wherein the perfume comprises at least 30% by weight of the perfume of a perfume material having a boiling point of less than 250°C at 1 atmosphere.

8. A method according to any one of the preceding claims wherein one of the active ingredients is a surfactant.

9. A method according to the preceding claim wherein the surfactant comprises is a siloxane surfactant.

10. A method according to any one of the preceding claims wherein one of the active ingredients is a preservative.