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(54) Titre : COMPOSITIONS DE BLANCHISSAGE ET LEURS PROCEDES D'UTILISATION
(54) Title: LAUNDRY COMPOSITIONS AND METHOD OF USE

(57) Abrégé/Abstract:
The invention provides a composition useful in maintaining color, reducing color uptake, and reducing pilling in washable textiles. Compositions of the invention comprise a polydiallyl dialkyl ammonium compound in combination with an enzyme resulting in a composition delivering strong color maintenance, dye transfer inhibition efficiency and pilling prevention especially on colored natural fiber textiles such as cotton, washable wool and silk. A laundry composition is disclosed comprising a color fixation polymer in an effective amount to maintain color in a washable textile, enzyme in an effective amount to remove pilling, and/or to aid in cleaning, and/or to prevent graying of the textile, an effective amount of an enzyme stabilizing component comprised of a polyol and propylene glycol, and an effective amount of buffer capable of maintaining the composition at a pH to maintain enzymatic activity. The laundry composition of the invention may further comprise water or an antimicrobial agent. A method of treating washable textiles using such composition is also disclosed.

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(54) **Title**: LAUNDRY COMPOSITIONS AND METHODS OF USE

(57) **Abstract**: The invention provides a composition useful in maintaining color, reducing color uptake, and reducing pilling in washable textiles. Compositions of the invention comprise a polydiallyl dialkyl ammonium compound in combination with an enzyme resulting in a composition delivering strong color maintenance, dye transfer inhibition efficiency and pilling prevention especially on colored natural fiber textiles such as cotton, washable wool and silk. A laundry composition is disclosed comprising a color fixation polymer in an effective amount to maintain color in a washable textile, enzyme in an effective amount to remove pilling, and/or to aid in cleaning, and/or to prevent graying of the textile, an effective amount of an enzyme stabilizing component comprised of a polyol and propylene glycol, and an effective amount of buffer capable of maintaining the composition at a pH to maintain enzymatic activity. The laundry composition of the invention may further comprise water or an antimicrobial agent. A method of treating washable textiles using such composition is also disclosed.

LAUNDRY COMPOSITIONS AND METHODS OF USE

Field of the Invention

The present invention relates in general to fabric color and care compositions, for use prior to or during washing of textiles such as in pre-soak or wash cycles. In particular, the invention relates to color maintenance of the textiles or linens and to inhibition of dye transfer from the wash or pre-soak liquor onto the textiles. Additionally, the invention relates to reducing pilling of textiles. A stand alone composition is provided for such treatment of textiles. However, the composition of the invention may also be incorporated into a laundry pre-treatment or detergent. A method of treating textiles for the purpose of color maintenance and dye transfer inhibition is also provided.

Background of the Invention

State of the art textile-cleaning is stressful to the textiles being cleaned. Frequent washing of the garments in a washing machine followed by subsequent drying in a tumble dryer is associated with severe mechanical stress of the fabric. Forces of friction frequently lead to damage on the textile fabric, as evidenced by pilling. Each washing and drying operation as well as the use of the garments or linens causes further detachment and/or breakage of tiny fibers on the surface of the textile fabric.

In addition to the mechanical stresses of washing, drying, and wearing or using garments and linens, textiles are subjected to chemical stressors as well. The heat and alkalinity associated with the wash cycle of a residential washer may be harsh to the fabric. This harshness is compounded in the wash cycle of a professional or institutional washer where temperatures and alkalinity increase substantially as compared to those found in residential washers. Both the professional or institutional and the residential settings subject the textiles to conditions that promote dye release. Dye or colorant release is problematic for two reasons. First, the original color of the garment is compromised due to release of the colorant. That is, the garment fades. Second, the garment is then also subjected to dye in the wash liquor that can be absorbed by the garment resulting in graying of the original color. A classic example of

such color release and transfer is when a red shirt is washed with white socks resulting in a faded red shirt and pink socks. Color release or fading and color transfer are both undesirable and result in unwanted side effects when washing textiles.

Anionic surfactants have a detrimental effect on color stability by removing (excess) dye from fabrics. The detrimental effect varies with the anionic surfactant type.

Laundry detergents are commercially available that ostensibly include "color-guarding" ingredients. It is not known whether or not these "color-guarding" ingredients serve to reduce color release or to inhibit color uptake, or both. Likewise, nonwoven sheets are also commercially available offering "color blocking." In order to use such sheets, a sheet is placed in the wash chamber. It is believed that these nonwoven sheets are effective at inhibiting color transfer to the garments from the wash liquor because the sheets have a large surface area with a higher affinity for the colorants than the garments thereby absorbing the dye from the wash liquor before the garments are affected. However, it is doubtful that such sheets are actually effective at reducing color release from the textiles. In the case of the nonwoven sheets, the sheeting must be retrieved from the laundry load and discarded. This adds another step and the possibility that the grayed nonwoven sheet will be mixed into the dryer and end up in a guest's bed at a hotel, mixed in with towels at a hospital or gym, or folded in with laundered clothes. In the institutional setting, all are unprofessional and undesirable. In the best case scenario, the nonwoven sheet is discarded into the trash ending up in a landfill. This is not ideal as the population strives to endorse and use environmentally friendly products.

A need exists for a composition for treating textiles that may be provided as a stand alone composition that is useful regardless of the detergent or softener choice. Such a composition will be effective in reducing pilling, reducing dye or colorant release from textiles (in other words, enhancing color maintenance) and inhibiting dye or colorant uptake or transfer.

Summary of the Invention

The present invention provides a liquid, physically, microbiologically and chemically stable composition with clearly visible customer benefit on colored and white textiles by color fixation, dye transfer inhibition and de-pilling of textiles. The benefit of using such composition is prolonged textile lifetime. In contradiction to prior art, compositions of the invention have a wide area of application. That is, compositions of the invention are relatively insensitive to the wash or presoak liquor pH, insensitive to water temperatures, wash process and chemical environment including surfactants and builders used during the wash cycle.

The composition of the present invention comprises a polydiallyl dialkyl ammonium compound in combination with a cellulase resulting in a composition delivering strong color maintenance, dye transfer inhibition efficiency and pilling prevention especially on colored natural fiber textiles such as cotton, washable wool and silk. A laundry composition is disclosed comprising a color fixation polymer in an effective amount to maintain color in a washable textile, enzyme in an effective amount to remove pilling, and/or to aid in cleaning, and/or to prevent graying of the textile, an effective amount of an enzyme stabilizing component comprised of a polyol, and an effective amount of buffer capable of maintaining the composition at a pH to minimize enzyme denaturing. In an embodiment the composition of the invention comprises a pH below about eight. The laundry composition of the invention may further comprise water.

Alternatively, the composition of the invention may be provided as a concentrate and the end user may dilute the concentrate composition with water thereby creating a use concentrate on site.

In embodiments of the invention, the composition comprises less than about 5 weight % anionic surfactant, less than about 4 weight percent, or less than about 3 weight percent anionic surfactant. The buffer may be comprised of trisodium citrate dihydrate, the color fixation polymer may be comprised of at least one polydiallyl dialkyl ammonium compound. In an embodiment the polydiallyl dialkyl ammonium

compound is comprised of a chloride compound, in particular, polydiallyl dimethylammonium chloride and is effective in inhibiting color transfer.

The laundry composition of the invention may comprise an antimicrobial agent in an effective amount to prevent growth of microbes in the composition. In an embodiment the antimicrobial agent is comprised of phenoxyethanol.

In addition to controlling the pH for enzyme stability, in an embodiment of the present invention the enzyme stabilizing component may be comprised of sorbitol and propylene glycol. In an embodiment the enzyme of the composition is comprised of cellulase.

A laundry composition for inhibiting dye transfer and maintaining color is taught comprising at least one polydiallyl dialkyl ammonium compound, cellulase, polyol, propylene glycol, and buffer for maintaining the composition at a pH suitable for enyzymatic stability.

A method of treating washable textiles is also disclosed. Such method comprises the steps of placing the textiles having an initial color into a wash and/or pretreatment liquor; adding a treating composition to the wash and/or pretreatment liquor, the treating composition comprising at least one polydiallyl dialkyl ammonium compound, cellulase, sorbitol, propylene glycol, and buffer such that the pH of the composition is suitable for maintaining enyzymatic stability; and rinsing the textiles with water wherein the textiles substantially maintain their initial color and/or the textiles resist dye transfer from the pretreatment and/or wash liquor.

Detailed Description of the Invention

Definitions

For the following defined terms, these definitions shall be applied, unless a different definition is given in the claims or elsewhere in this specification.

All numeric values are herein assumed to be modified by the term "about," whether or not explicitly indicated. The term "about" generally refers to a range of numbers that one of skill in the art would consider equivalent to the recited value (i.e.,

having the same function or result). In many instances, the terms "about" may include numbers that are rounded to the nearest significant figure.

Weight percent, percent by weight, % by weight, and the like are synonyms that refer to the concentration of a substance as the weight of that substance divided by the weight of the composition and multiplied by 100.

The recitation of numerical ranges by endpoints includes all numbers subsumed within that range (e.g. 1 to 5 includes 1, 1.5, 2, 2.75, 3, 3.80, 4, and 5).

As used in this specification and the appended claims, the singular forms "a", "an", and "the" include plural referents unless the content clearly dictates otherwise. Thus, for example, reference to a composition containing "a compound" includes a mixture of two or more compounds. As used in this specification and the appended claims, the term "or" is generally employed in its sense including "and/or" unless the content clearly dictates otherwise.

The term "alkyl" refers to a straight or branched chain monovalent hydrocarbon radical having a specified number of carbon atoms. Alkyl groups may be unsubstituted or substituted with substituents that do not interfere with the specified function of the composition and may be substituted once or twice with the same or different group. Substituents may include alkoxy, hydroxy, mercapto, amino, alkyl substituted amino, nitro, carboxy, carbanoyl, carbanoyloxy, cyano, methylsulfonylamino, or halo, for example. Examples of "alkyl" include, but are not limited to, methyl, ethyl, n-propyl, isopropyl, n-butyl, s-butyl, t-butyl, n-pentyl, n-hexyl, 3-methylpentyl, and the like.

As used herein the term “polyol” refers to any organic molecule having more than one hydroxy group.

The term "surfactant" or "surface active agent" refers to an organic chemical that when added to a liquid changes the properties of that liquid at a surface.

The term “colorant” or “dye” or “pigment” are used interchangeably herein and refer to any textile-altering composition that alters the color of a textile.

Unless otherwise stated, all weight percentages provided herein reflect the weight percentage of the raw material as provided from the manufacturer. The active

weight percent of each component is easily determined from the provided information by use of product data sheets as provided from the manufacturer.

Colored natural fibers, especially when of low quality, release redundant dyes not fixed to the fiber into a wash or presoak solution. Natural fibers derived from plants include those that are generally comprised of cellulose. Examples of plant derived cellulosic fibers include cotton, jute, flax, ramie, sisal, and hemp. Natural fibers derived from animals generally comprise proteins. Examples of protein derived fibers include silk, wool, angora, mohair and alpaca. Most if not all of these natural fibers suffer from color loss or fading. This color loss leads to a less favorable fabric appearance and dye transfer to other textiles. Such color transfer is most apparent on white textiles. The addition of a color fixation agent stops color loss and transfer.

Color Fixation Polymer

It has now surprisingly been found that colorants such as dyes or pigments can be stabilized without the use of anionic surfactants. In fact, the present invention is effective in the substantial absence of anionic surfactants. It has surprisingly been found that color stabilizing polymers can be used to inhibit deposition of colorants in pretreatment or wash liquor and also to maintain colorant in the textile fibers. Compositions of the invention are formulated with at least one color fixation polymer.

The dye fixative materials used in this invention are generally all water-soluble materials. Preferably non-precipitating dye fixatives are useful in compositions of the invention. Examples of non-precipitating dye fixatives useful herein include but are not limited to a number that are commercially marketed by CLARIANT Corporation under the Sandofix®, Sandolec® and Polymer VRN® tradenames. These include, for example, Sandofix SWE®, Sandofix WA®, Sandolec CT®, Sandolec CS®, Sandolec C1®, Sandolec CF®, Sandolec WA®. and Polymer VRN®. Other suitable dye fixatives are marketed by Ciba-Geigy Corporation underthe tradename Tinofix EW® and by Hoechst Celanese Corporation under the tradename Cassofix FRN-300®. In

other embodiments of the invention the color fixation polymer is comprised of a polydiallyl dialkyl ammonium compound, preferably a chloride. Polydiallyl dimethylammonium chloride is particularly preferred in one embodiment. Polydiallyl dimethylammonium chloride is commercially available from Sigma-Aldrich or Cognis. In embodiments of the invention, the color fixation polymer is included in compositions of the invention in an amount from about 0.05 to about 5.0 weight percent, from about 0.10 to about 3 weight percent, and from about 0.50 up to about 2.5 weight percent. The invention anticipates that other color-fixing polymers may be included as a combination of polymers, or a single color fixation polymer may be employed in compositions of the invention.

Enzyme

Washing natural textiles in washing machines lead to small, ball-shaped aggregates of loose fibers called pills. The addition of a special enzyme prevents the formation of these pills. Cellulases can contribute towards color retention and towards increasing fabric softness by removing pilling and microfibrils. Cellulases such as commercially available as Carezyme® from Novozymes are useful in the present invention. As stated, the presence of cellulases serves to prevent pilling of fabrics during the washing process. During these processes, abrasion and fiber damage result in formation of loose fibers or "fuzz" that can become entangled and form "pills." Cellulase enzymes also act to remove existing pilling formed during wear so as to restore the original fabric appearance during subsequent wash or other treatment cycles. Thus, fabrics with pills and fuzz often exhibit a worn appearance. Furthermore, given the propensity of damaged fibers to suffer further dye and pigment loss during both laundering and wear which exposes the un-dyed fiber core, this results in a faded appearance. Cellulase is included in compositions of the invention in an amount from about 0.01 to about 2.0 weight percent, from about 0.05 to about 1.5 weight percent, from about 0.1 up to about 1.0 weight percent.

An example of a suitable enzyme is sold under the trade name Carezyme® cellulase enzyme product. Carezyme® is a cellulase produced by submerged fermentation of a genetically modified Aspergillus microorganism. Carezyme® removes the microfibrils, caused by wear and washing, which protrude from a fiber. The activity of Carezyme® depends on the conditions in which the enzyme is exposed (pH, temperature, other ingredients in the product). Carezyme® can be obtained with a cellulytic activity of 4500 ecu/gram or higher. Other cellulase preparations will be known to those skilled in the art and their use as described herein will be included within the scope of the present invention.

Since enzymes are proteins, care must be taken when formulating compositions including such proteins to ensure that the proteins are not denatured during formulation, storage, or handling. The denaturation of proteins such as enzymes can be caused by high temperatures, chemical interaction or pH. When incorporating a relatively expensive ingredient such as an enzyme into a composition, it is desirable to retain its activity. Therefore, once the enzymatic agent is added to the composition of the invention, the composition is preferably not heated to a temperature that will cause the proteins that comprise the enzyme to denature. Denaturants include but are not limited to certain acids such as acetic acid, trichloroacetic acid, and sulfosalicylic acid. Other denaturants include most organic solvents such as ethanol, methanol, and acetone. Denaturants are preferably avoided and are not included in compositions of the invention. Or, if they are included another ingredient is added to the composition either to neutralize the denaturant or to protect the enzyme.

As one may appreciate, if the pH of the composition of the invention becomes too alkaline or acidic, the proteins that comprise the enzymes will denature. As such, it is desirable to maintain the pH of the composition at around neutral. Compositions of the invention have a pH between about 6 and about 8. Of importance is the pH of the invention composition because storage at a high or low pH would inactivate any enzymes incorporated into the formulation. Less important is the pH of the wash liquor

when using compositions of the invention. The pH of the wash liquor when using the composition of the invention is preferably below about pH 12, below about pH 11, or below about pH 10. Above about pH 12, cellulases such as those incorporated into compositions of the invention lose their activity. While the skilled artisan will recognize that compositions of the invention will still be effective at color maintenance without the enzymatic activity, it is desirable to retain this de-pilling capability of the invention.

Buffer

As previously discussed, it is desirable to maintain the pH of compositions of the invention at a pH below about 12. Any buffering agent known in the art is useful for this purpose. Sodium citrates are useful in buffering compositions of the invention to ensure the pH of the composition does not become too highly alkaline thus denaturing the cellulasic enzyme. Preferably trisodium citrate dihydrate is included in compositions of the invention in an amount from about 0.01 weight percent up to about 0.3 weight percent, from about 0.05 to about 0.2 weight percent, from about 0.08 to about 0.18 weight percent.

Enzyme Stabilizers

In addition to stabilizing the enzymes of the composition by controlling the pH thereby limiting denaturation due to high alkalinity of acidity, the compositions also include enzyme stabilizers. The enzyme stabilizers act to protect the stability and thereby protect the activity of the enzymes. These include sugar alcohols also referred to as polyols, polyhydric alcohols, or polyalcohols. Polyols are a hydrogenated form of carbohydrate whose carbonyl group (aldehyde or ketone, reducing sugar) has been reduced to a primary or secondary hydroxyl group (hence the *alcohol*). Polyols have the general formula $H(HCHO)_{n+1}H$, whereas sugars have $H(HCHO)_nHCO$. Some common sugar alcohols or polyols include glycol, glycerol (also known as glycerine), erythritol, arabitol, xylitol, ribitol, isomalt, maltitol, and lactitol. Particularly useful in

compositions of the invention is the polyol sorbitol due to its low cost and ease of handling. Also useful in formulating compositions of the invention are mannitol, 1,2-propanediol, ethyleneglycol, glucose, fructose, lactose, and the like. In an embodiment of the invention polyol is included in an amount from about 10 to about 50 weight percent, from about 20 to about 40 weight percent, from about 25 to about 35 weight percent.

Another enzyme stabilizing ingredient preferably included in compositions of the invention include propylene glycols such as monopropylene glycol and the like. Propylene glycol is included in compositions of the invention in an amount from about 5 to about 40 weight percent, from about 10 to about 30 weight percent, and from about 15 to about 25 weight percent. Without being bound by theory, it is believed that the polyol in combination with the propylene glycol of the invention serve to stabilize the enzyme.

Antimicrobial Agent

Compositions of the invention optionally but preferably include an antimicrobial agent to limit or completely prohibit the growth of microbes when the composition is stored for extended periods of time. Due to the relatively gentle pH of the composition and the inclusion of water in diluted compositions of the invention, microbial growth may flourish and is of concern. Another concern when formulating compositions of the invention is to ensure that the antimicrobial agent does not compromise enzymatic activity. Surprisingly it was found that the preservative, phenoxyethanol, did not compromise enzyme stability in compositions of the invention. Phenoxyethanol is preferably included in compositions of the invention in amount from about 0.1 to about 10 weight percent, from about 0.2 to about 7 weight percent, and from about 0.5 to about 5 weight percent.

Examples of other antimicrobial agents useful in compositions of the invention include but are not limited to those selected from parahydroxy benzoic add and salts

thereof, (C1-C4) alkyl parahydroxy benzoates, sorbic add and salts thereof, ortho hydroxybenzoic acid and salts thereof, benzoic acid and salts thereof, (C1-C 4) alkyl benzoates, propionic acid and salts thereof, dehydroacetic acid and salts thereof, formic add and salts thereof, and undec-10-enoic add and salts thereof. Yet other examples of antimicrobial agents useful in compositions of the invention include but are not limited to preservatives selected from formaldehyde, paraformaldehyde, biphenyl-2-ol (ortho phenylphenol), 4,4-dimethyloxazolidine, 5-bromo-5-nitro-1,3-dioxane, 2-bromo-2-nitropropane-1,3-diol, 2,4-dichlorobenzyl alcohol, 5-chloro-2-(2,4-dichlorophenoxy)-phenol, 4-chloro-3,5-xylenol, 3,3'-bis-(1-hydroxymethyl-2,5-dioxoimidazolidinyl-4-yl)-1,1'-methylenedlu- rea (imidazolidinyl urea), poly(1-hexamethylene biguanidine hydrochloride), 2-phenoxyethanol, hexamethylenetetramine, benzyl alcohol, 1,3-bis-(hydroxymethyl)-5,5-dimethylimidazolidone-2,4-dione, 5-chloro-2-methylisothiazol-3(2H)-one, 2-methyl-isothiazol-3(2H)-one, benzisothiazolinone, 2-benzyl-4 chlorophenol, chlorhexidine and its digluconate, diacetate, and dihydrochloride salts, 1-phenoxy-propan-2-ol, cetyl pyridinium bromide and chloride, N-(hydroxymethyl-N-dihydroxymethyl-1,3-dioxo-2,5-imidazolinidyl-4)-N'-hyd- roxymethyl urea, sodium hydroxymethylglycinate, benzethonium chloride, benzalkonium chloride, bromide and saccharinate, 3-iodopropynylbutylcarbamate, benzisothiazolinone, triacetin, diazolidinyl urea, and cis-1-3-chloroallyl-3,5,7-triaza-1-azoniaadamantane chloride to name a few.

Water

Water is optionally included in compositions of the invention. Compositions of the invention are provided either as an undiluted concentrate or are as a somewhat diluted composition or may be diluted to a use composition. Compositions according to the invention may be provided in heavily diluted form and, in that case, contain up to about 95% by weight water. However, they preferably contain less water, for example from about 0 to 80% by weight, from about 20 to 70% by weight, and from about 30 to 60% by weight water.

It should be understood that the water provided as part of the concentrate can be relatively free of hardness. It is expected that the water can be deionized to remove a portion of the dissolved solids. The concentrate is then diluted with water available at the locale or site of dilution and that water may contain varying levels of hardness depending upon the locale. Although deionized is preferred for formulating the concentrate, the concentrate can be formulated with water that has not been deionized. That is, the concentrate can be formulated with water that includes dissolved solids, and can be formulated with water that can be characterized as hard water.

The water of dilution that can be used to dilute the concentrate can be characterized as hard water when it includes at least 1 grain hardness. It is expected that the water of dilution can include at least 5 grains hardness, at least 10 grains hardness, or at least 20 grains hardness.

It is expected that the concentrate will be diluted with the water of dilution in order to provide a use solution having a desired level of textile care properties. It is expected that the weight ratio of concentrate to water of dilution will be between about 1:1 and about 1:500, between about 1:2 and about 1:450, between about 1:3 and about 1:400, and between about 1:5 and about 1:350.

The compositions of the invention may further include defoamer, anti-redeposition agent, and the like.

Delivery

The preferred embodiment is a liquid, liquid gel or gelled composition for color and fabric care.

Formulating Compositions of the Invention

Compositions of the invention may be prepared in continuous or batch processes. In one embodiment, the color fixation polymer is added to deionized water. Sorbitol and propylene glycol are combined and then added to the DI water/polymer blend. The combination is mixed to homogeneity. The buffer and antimicrobial agents are added before finally adding the enzyme.

Substantially Free of Anionic Surfactants

Compositions of the invention are substantially free of anionic surfactants. Anionic surfactants are not necessary for efficacy of the invention and may even work in opposition to the goals of the invention. Anionic surfactants are preferably avoided in compositions of the invention but if they are included they are included in an amount less then about 2 weight percent, less than about 3 weight percent, less than about 4 weight percent, and less than about 5 weight percent. The anionic surfactants to avoid may include a negatively charged water solubilizing group. Examples of anionic surfactants which are preferably not incorporated into the formulations of the present invention may include the ammonium, substituted ammonium (e.g., mono-di-, and riethanolammonium), alkali metal and alkaline earth metal salts of C_6-C_{20} fatty acids and rosin acids, linear and branched alkyl benzene sulfonates, alkyl sulfates, alkyl ether sulfates, alkane sulfonates, alpha olefin sulfonates, hydroxyalkane sulfonates, fatty acid monoglyceride sulfates, alkyl glyceryl ether sulfates, acyl sarcosinates and acyl N-methyltaurides.

Methods of Using Compositions of the Invention

The invention comprises color care compositions and methods of use to provide protection to textiles from fading and appearance change, in addition to fiber and color maintenance during consumer and industrial treatment of clothing and textiles. The compositions have several key performance actives that target common dye fading and textile damaging mechanisms experienced during the wash and dry processes, and during wear and exposure to the elements. Compositions of the invention may be useful in a presoak, prewash, or wash cycle of laundry. In general, it is desirable to incorporate compositions of the invention into the prewash or if there is no prewash at the beginning of the mainwash. Likewise, it is desirable to incorporate compositions of the invention into any cycle where preventing color uptake (such as graying) is important to avoid. In general, it is desirable to dose compositions of the

invention when the textiles are first exposed to detergent and water thereby limiting the adverse effects of detergent and water on the color and texture of the textiles. Compositions of the invention are particularly useful when washing colored textiles. However, compositions of the invention also demonstrate desirable effects on white textiles as well with their reduction of pilling.

In an embodiment, the present invention is useful as a color and care composition for pre-soaking or pre-treating fabrics. In this first embodiment, the method of the present invention includes adding a predetermined volume or amount of the composition of the present invention to water or other cleaning solution. This pre-soak or pre-treatment is especially important for setting or fixing dyes. The methods of use provide for introduction of selected compositions in a hand-soak or machine pre-soak situation.

In another embodiment of the method of use of the present invention, the composition is added to a washing cycle, along with a laundry or fabric detergent composition or solution. In the main wash cycle, the present invention can be used either alone or in combination with a regular detergent or laundry additive such as a fabric softener.

In another embodiment, the present invention is a rinse additive, introduced either alone or in combination with a fabric softener. In addition, further compositions and methods of use of the present invention employ a dispensing device which provides for repeated and automatic dispensing of an effective dose of this composition through each machine cycle.

The compositions of the present invention can be prepared by a number of methods. Some convenient and satisfactory methods are disclosed in the following examples. The present invention can be better understood with reference to the following examples. These examples are intended to be representative of specific

embodiments of the invention, and are not intended as limiting the scope of the invention.

Examples

For the following examples, a composition according to the invention was prepared according to the formulation provided in Table 1 below.

Table 1

Ingredient	Weight percent
Poly dimethyl diallyl[1] ammoniumchloride	1.79
Deionized Water	47.05
Sorbitol Solution[2]	28.57
Monopropylene Glycol[3]	20.0
Sodium Citrate Dihydrate, Granular[4]	0.14
2-Phenoxyethanol[5]	2.0
Cellulase-Enzyme (Proteinenzyme)[6]	0.45
	100.00

[1] POLYQUARDT™ FDI available from Cognis at a 40% solution

[2] Neosorb 70/70 available from Roquette or Mritol 160 available from Amylum at a >50% concentration of sorbitol

[3] Available from Dow

[4] Available from Jungbunzlauer

[5] Available from Transol

[6] Carezyme™ 4500 L available from Novozymes

Example 1

The composition prepared according to Table 1 above was used to compare color maintenance of textiles. The Initial L values of duplicate colored textiles were taken before washing the textiles using a Hunter Lab instrument. A Hunter Lab Colorquest™ XE spectrophotometer was used with standardization settings as follows: Mode = RSIN, Viewing Area = Large, Port Size = 1.00", and UV Filter = 420nm. Hunter Lab measuring settings include: Selection: CIELAB, Illuminant: D65, and Observer: 10 degree. One set of the textiles was washed using a wash cycle as follows:

Fifteen g/1 of Triplex Energy Gran™ and 2ml/l of Triplex Energy Plus™ (both available from Ecolab, Inc located in St. Paul, MN USA) were added to the wash bath. The textiles were washed for 4 minutes in a cold wash that was tap water temperature. The cold wash was followed by a 15 minute wash at 55°C. A second bath was run for 10 minutes at 75 degrees C to which additional dosage of l0g/1 of Triplex Energy Gran and 3ml/l of Turbo Break™ along with 5 of ml/1 Ozonit Super™ (also from Ecolab) was added.

The second set of textiles was washed using the same conditions except that 8ml/l of the composition of the invention prepared according to Table 1 above was added to the wash liquor. After the wash and dry cycles were complete, readings (L, a, b) were taken for each towel on the Hunter Lab Instrument. The dataset provided in Table 2 below shows the difference in color maintenance observed with and without the composition of the invention on colored textiles. Data is expressed in numbers on the Hunter Lab-scale:

Table 2

Color Maintenance	L	a	b	Color Distance
Initial Color (Unwashed)	39.8	58.4	28.6	
Washed without Composition of Invention	43.4	59	27.2	3.96
Washed with Composition of the Invention	38.3	56.78	27.3	2.55

The data in Example 1 /Table 2 demonstrates that using compositions of the invention results in better color maintenance than when the same textiles are washed in the absence of compositions of the invention. A smaller color distance is indicative of better color maintenance as compared to the original textile. The less fade value, the better the result.

Example 2

This Example demonstrates the difference in dye transfer inhibition observed when washing white textiles with and without a composition of the invention. As in Example 1, the Initial L values of duplicate white textiles were taken before washing the textiles using a Hunter Lab instrument. All settings were identical to those provided in Example 1 except if listed. The duplicate white towels were washed in the same conditions as provided in Example 1 above, with and without inclusion of the composition of the invention. After the wash and dry cycles were complete, final readings (L, a, b) were taken for each textile on the Hunter Lab Instrument. The difference between the L initial and the L final is provided as the Color Distance in the table below.

Table 3

Reduction of dye transfer	**L**	**a**	**b**	**Color Distance**
Initial (Unwashed)	88.5	1.2	2.2	_____
Washed without Composition of the Invention	81.2	8.7	3.6	10.52
Washed with Composition of the Invention	88.1	3.4	1.7	2.27

The data in Example 2/Table 3 demonstrates that using compositions of the invention results in reduction of dye transfer than when the same textiles are washed in the absence of compositions of the invention.

Example 3

This Example 3 supports data provided in Example 1 above except that the composition of the invention was included in both the prewash and the wash cycle. The Initial L values of duplicate colored textiles were taken before washing the textiles using a Hunter Lab instrument. The Initial L values were noted but are not provided herein. Duplicates of the new colored textiles were washed in horizontal drum washing extractors in a standard process using an Electrolux Wascator FLE 120 MP washer and employing a 15 minute pre-wash at 55°C. Ten grams granular Basis detergent available

from Ecolab, Inc. was used in the pre-wash cycle for both sets of textiles per kg textile at water to textile ratio of 1:4. One set of colored textiles included 2 ml of the composition of the invention per kg textile prepared according to Table 1 above and the other did not include the composition of the invention. A 10 minute main wash at 75°C with a dosage of 10 grams per kg textile Basis granular detergent available from Ecolab was then undertaken. In the set of textiles that included the composition of the invention in the prewash, 2 ml per kg textile of the composition from Table 1 was again included. The other washer again lacked the composition of the invention. Both wash cycles also included 3 ml per kg textile of an alkali booster available as Turbo Break from Ecolab, Inc. located in St. Paul, MN

Following completion of the wash and a dry cycles, the L values of the colored textiles was again taken. This difference between the Initial L value and the final L value is provided in Table 4 below as ΔE.

Table 4

	Average Color Distance [ΔE]
Process without addition of invention composition	16.5
Process with addition of invention composition	2.67

The data provided in Example 3/Table 4 illustrates a higher degree of color maintenance when the composition of the invention was employed in the prewash and wash cycles as compared to when it was omitted. A smaller delta value shows less color change or greater color maintenance.

Example 4

Example 4 shows the efficacy of adding an antimicrobial agent to compositions of the invention in prohibiting microbial growth. Compositions A and B were prepared according to the following formulations provided in Table 5. Composition A included the antimicrobial agent 2-phenoxyethanol while Composition B lacked any antimicrobial agent.

Table 5

	Composition A	Composition B
Ingredient	**Weight percent**	**Weight percent**
Poly dimethyl diallyl[1] ammoniumchloride	1.79	1.79
Deionized Water	47.05	49.05
Sorbitol Solution[2]	28.57	28.57
Monopropylene Glycol[3]	20.0	20.0
Sodium Citrate Dihydrate, Granular[4]	0.14	0.14
2-Phenoxyethanol[5]	2.0	0.0
Cellulase-Enzyme (Proteinenzyme)[6]	0.45	0.45
	100.00	**100.00**

The microbiological susceptibility of the formulations of Composition A and B were tested according to AA CCM 4.2-051 by adding 1% of a solution containing $3x10^{8}$ bacteria and $3x10^{7}$ fungi to a sample of each Composition A and B. The inoculated compositions were stored at 40^{0}C for 21 days. After 21 days a sample was taken from each inoculated composition to determine bacterial and fungal load. The samples were returned to 40^{0}C and stored for a total of 6 weeks after which another sample was taken to determine bacterial and fungal load. The data provided below in Table 6 demonstrates that the formulation without phenoxyethanol (Composition B) is not microbiologically stable while the addition of 2% phenoxyethanol (Composition A) delivers sufficient microbiological stability.

Table 6

		Bact-eria CFU*	**Fungi CFU**	**Microbiological conservation**
Composition B (without phenoxyethanol)	**Fresh**	7	21	Sufficient
	21 days storage at 40°C	7	>1000	Insufficient
Composition A (with phenoxyethanol)	**Fresh**	7	14	Sufficient
	6w storage at 40°C	7	7	Sufficient

*Colony forming units

Example 5

This Example 5 illustrates the stability of the enzyme in compositions of the invention with and without antimicrobial agent. Compositions A and B were prepared according to Table 5 above. Compositions A and B were initially tested for enzymatic activity (shown as "Fresh" in table 7 below). The Compositions were then stored at 35°C for 4 weeks after which they were again checked for enzymatic activity. The enzyme content was checked by an outside contractor (Henkel Analytical Services) according to a standard addition protocol known as "Prüfverfahren VTA 31-X-01002.01". The skilled artisan will know means to check enzyme activity by other suitable methods.

The data shown in Table 7 below shows the chemical stability of the compositions as shown by enzymatic activity of Carezyme® cellulase:

Table 7

	storage condition	Residual enzyme activity
Color Care booster without Phenoxyethanol	Fresh	100%
	4 weeks @ 35°C	86%
Color Care booster with Phenoxyethanol	Fresh	100%
	4 weeks @ 35°C	>95%

An enzyme activity above 80% after 4 weeks storage at 35°C corresponds to one year shelf stability under ambient conditions.

The invention has been described with reference to various specific and preferred embodiments and techniques. The scope of the claims should not be limited by the preferred embodiments set forth in the examples, but should be given the broadest interpretation consistent with the description as a whole.

WHAT IS CLAIMED IS:

1) A laundry composition, comprising:

a) color fixation polymer in an effective amount to maintain the color of textiles in a wash process, wherein the color fixation polymer is comprised of at least one polydiallyl dialkyl ammonium compound.

b) enzyme in an effective amount to remove pilling, or to aid in cleaning, or to prevent graying of the textile,

c) an effective amount of an enzyme stabilizing component comprised of a polyol and propylene glycol, and

d) an effective amount of buffer capable of maintaining the laundry composition at a pH to limit denaturing of enzyme;

wherein the composition comprises less than 5 weight percent anionic surfactant.

2) The laundry composition of claim 1 wherein the buffer is comprised of trisodium citrate dihydrate.

3) The laundry composition of claim 1 wherein the at least one polydiallyl dialkyl ammonium compound is comprised of polydiallyl dimethylammonium chloride.

4) The laundry composition of claim 1 wherein the color fixation polymer is further effective in inhibiting color transfer.

5) The laundry composition of claim 1 further comprising an antimicrobial agent in an effective amount to prevent growth of microbes in the composition.

6) The laundry composition of claim 5 wherein the antimicrobial agent is comprised of phenoxyethanol.

7) The laundry composition of claim 1 wherein the enzyme stabilizing component is comprised of sorbitol and propylene glycol.

8) The laundry composition of claim 1 wherein the enzyme is comprised of cellulase.

9) The laundry composition of claim 1 wherein the buffer is effective at maintaining the pH below 8.

10) The laundry composition of claim 1 further comprising water.

11) A laundry composition for inhibiting dye transfer and maintaining color, comprising: at least one polydiallyl dialkyl ammonium compound, cellulase, polyol, propylene glycol, and buffer for maintaining the composition at a pH suitable for enyzymatic stability, wherein the composition comprises less than 5 weight percent anionic surfactant.

12) The laundry composition of claim 11 further comprising an antimicrobial agent.

13) The laundry composition of claim 12 wherein the antimicrobial agent is comprised of phenoxyethanol.

14) The laundry composition of claim 11 wherein the polyol is comprised of sorbitol.

15) The laundry composition of claim 11 wherein the at least one polydiallyl dialkyl ammonium compound is comprised of polydiallyldimethylammoniumchloride.

16) The laundry composition of claim 11 wherein the buffer is comprised of trisodium citrate dihydrate and the pH of the composition is below 8.

17) A laundry composition suitable for maintaining color of washable textiles and inhibiting color transfer to washable textiles, comprising: at least one polydiallyl dialkyl ammonium compound up to 10 weight percent, at least one cellulase up to 5 weight percent, at least one polyol up to 40 weight percent, propylene glycol up to 30 weight percent, and up to 5 weight percent buffer such that the enzyme maintains activity during storage, wherein the composition comprises less than 5 weight percent anionic surfactant.

18) The laundry composition of claim 17 further comprising an agent to prevent growth of microbes in the composition.

19) The laundry composition of claim 17 wherein the polydiallyl dialkyl ammonium compound is comprised of polydiallyldimethylammoniumchloride.

20) A method of treating washable textiles comprising the steps of:

a) placing the textiles having an initial color into a wash liquor;

b) adding to the wash liquor a treating composition, comprising: at least one polydiallyl dialkyl ammonium compound, cellulase, sorbitol, propylene glycol, and buffer such that the pH of the composition is suitable for maintaining enyzymatic stability and wherein the composition comprises less than 5 weight percent anionic surfactant; and

c) rinsing the textiles with water wherein the textiles substantially maintain their initial color and/or the textiles resist dye transfer from the wash liquor.

21) The method of claim 20 wherein the treating composition further comprises an antimicrobial agent.

22) The method of claim 21 wherein the antimicrobial agent is comprised of phenoxyethanol.

23) The method of claim 20 wherein the polydiallyl dialkyl ammonium compound is comprised of polydiallyldimethylammoniumchloride.

24) A laundry composition, consisting essentially of:

a) color fixation polymer in an effective amount to maintain color in a washable textile, the color fixation polymer comprising at least one polydiallyl dialkyl ammonium compound.

b) enzyme in an effective amount to remove pilling, and/or to aid in cleaning, and/or to prevent graying of the textile,

c) an effective amount of an enzyme stabilizing component comprised of polyol and propylene glycol,

d) an effective amount of buffer capable of maintaining the laundry composition at a pH to limit denaturing of enzyme, and

e) water;

wherein the composition comprises less than 5 weight percent anionic surfactant.