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LAUNDERING COMPOSITIONS

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ABSTRACT OF THE DISCLOSURE

A composition comprising a quaternary ammonium textile softener tending to yellow textiles and an alkali metal carboxymethyl cellulose as an anti-yellowing agent.

This is a continuation-in-part of application Ser. No. 283,702, filed May 28, 1963, now abandoned.

This invention relates to laundering compositions and more particularly to additives for detergent compositions and as components of such compositions.

In recent years there has been a growing need for softening agents for use in laundering, particularly in automatic washing machines where they are used primarily in a rinse cycle, rather than in the wash cycle. Softening agents are used to render fabrics or textiles soft and the term "softening" refers to the handle, hand, touch or feel; this is the tactile impression given by textiles to the hand or body and is of aesthetic and commercial importance. Softening realized with such agents varies with a number of factors including: laundry load weight and composition, types of bleach used, detergents used, the initial degree of harshness, type of washing machine, water temperature, etc. To date, therefore, it is generally necessary that a detergent be used in the wash cycle and, thereafter, a fabric softener is used in the rinse cycle. This is an expensive and inconvenient procedure; the use of the softener almost doubles the cost of doing a wash and a waiting period is involved for the launderer.

While softening agents used in the rinse cycle alone have been effective in rendering textiles soft, a problem has arisen because of the wide variety of water supplies containing colored colloidal particles. A number of water supplies in the United States have color values above 5 (Lumetron colorimeter; cobalt-platinum standard). For example Jersey City, N.J., tap water varies seasonally from about 10 to about 15 in color value. Some well waters have color values of greater than 50. Color imparted to textiles laundered with cationic softening agents has been found to be related to the amount of softening given to the textiles. That is, with highly colored water supplies, laundered textiles have a greater degree of yellowness or yellow color when a substantial and effective amount of softening agent is used herewith.

There is no intent herein to limit this invention to a theory of reaction or action; however, the most probable action is the following. In a system of water, clothes and cationic softener, fabric surfaces tend to be electro-negative and therefore attract a positively charged cationic agent, resulting in deposition of a cationic layer. If the concentration of cationic agent is greater than that needed to balance the fiber charge, a thicker layer accumulates on the fabric by means of adhesion, and a surplus electro-positive charge is produced thereon. This surplus charge then attracts electro-negatively charged colloidal particles in the water. At the same time, the cationic agent dispersed in the water is reducing the zeta potential of the suspended material in the water to zero (or, if enough cationic agent is present, the particles acquire a positive zeta potential). The "neutralized" particles then agglomerate and are deposited upon the fabric surfaces.

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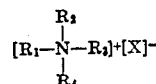
It has been found, therefore, that the softer the fabric, the yellower it is. This is particularly true in the rinse cycle of automatic laundering.

Since cationic agents are used for softening, it is desirable to find agents compatible therewith in an effort to counter the yellowing phenomenon. This phenomenon has been minimized by using one or more of a group of compounds with the cationic softeners used in the compositions of this invention. Surprisingly, the effective compounds include materials tending to be incompatible with the said softeners.

It is an object of this invention, therefore, to provide compositions containing in combination a cationic softening agent of certain character and an anti-yellowing agent for laundering textiles. It is a further object of the invention to provide such compositions for use in a wash or a rinse cycle of automatic laundering operations, and for use in conventional non-automatic operations. Still another object of the invention is to provide an additive composition to be used in conjunction with a detergent in laundering textiles. Still another object of the invention is to provide softener-detergent compositions. A further object is the provision of laundry compositions having detergent, softening and bleaching capabilities, such that they are "total laundry care compositions." Other objects of the invention will become apparent from the following description.

Broadly stated, according to the present invention, the foregoing objects are realized with compositions comprising:

(a) A quaternary ammonium salt having two higher alkyl groups and normally tending to soften textile materials and preferably a quaternary ammonium salt represented by the general formula



wherein R_1 and R_2 are alkyl groups each containing from 1 to 3 carbon atoms, R_3 and R_4 are aliphatic groups each containing from 12 to 22 carbon atoms, and X is selected from halogen and methyl sulfate; and

(b) An alkali metal carboxymethyl cellulose, said alkali metal being selected from the group consisting of sodium and potassium.

The compositions containing (a) and (b) are preferably used in powder form.

As indicated above, the cationic agents of this invention are represented by the general formula given in connection with (a). These compounds are quaternary ammonium compounds. They are characterized by dispersibility in water. Representative of such compounds are: distearyl dimethyl quaternary ammonium chloride; distearyl dimethyl quaternary ammonium bromide; distearyl dimethyl quaternary ammonium methylsulfate; dicoco dimethyl quaternary ammonium chloride; dimethyl arachidyl, behenyl quaternary ammonium chloride; dialkyl dimethyl quaternary ammonium chloride the alkyl groups of which comprise a mixture consisting essentially of 24 parts of hexadecyl, 75 parts of octadecyl and 1 part of octadecenyl, the latter ammonium chloride is also known as dihydrogenated ditallow dimethyl ammonium chloride and is particularly preferred herein. It is to be understood that mixtures of two or more cationic agents can be employed if desired.

The term "coco" refers to fatty acid groups formed in coconut oil fatty acids. Such acids contain from about 8 to about 18 carbon atoms per molecule, predominating in C_{12} - C_{14} acids.

The alkali metal carboxymethylcellulose generally contains 0.4 to 1.5, and preferably 0.5 to 0.8, carboxymethyl groups per cellulose unit.

An important factor herein is the ratio, by weight, of the cationic agent to the anti-yellowing agent: (a)/(b). The ratio ranges from about 1.5/1 to about 4/1, with optimum results being obtained with a ratio of about 3/1. For example, when the ratio exceeds about 3/1, excellent softness is retained but yellowness is not materially reduced. At the 3/1 ratio whiteness is apparent or, expressed otherwise, yellowness is significantly reduced with only a slight loss of softness.

It is contemplated that the compositions containing (a) and (b) can be used in the form of additives for addition to laundering compositions. As addition agents, then, the compositions can be added either in a wash cycle or in a rinse cycle, or in both cycles when desired. With respect to rinse cycle application, the nature of the detergent-active ingredient used in the preceding wash cycle is of little moment. In such application, the said ingredient can be anionic, cationic, non-ionic, or a combination of the same. However, when an additive composition of this invention is used in the wash cycle, maximum effectiveness is realized with non-ionic detergents. Substantial quantities of anionic detergents in the wash cycle reduce the effectiveness of the additive composition used in the same cycle.

It is also contemplated that the combination of softening agent (a) and anti-yellowing agent (b) can be used together with a detergent in a softener-detergent composition. In the latter, a non-ionic detergent is used. And it is to be understood that one or several of such detergents can be used in the compositions.

A wide variety of non-ionic detergents are available in the art and, broadly, all such detergents are contemplated herein. In general, such detergents have a hydrophobic group of at least 8 carbons, preferably 8-30 carbons, and an hydrophilic group attached to confer detergent properties in water. One particular class of such detergents is that formed by oxyalkylation of fatty acids, alcohols, phenols, mercaptans, thiophenols, amines and amides with ethylene oxide, propylene oxide and related oxides. Such materials usually have at least 5 mols of alkylene oxide, preferably 5-30 mols depending upon the particular hydrophobic group. Representative of such materials are those formed by condensation of ethylene oxide and alkyl phenols or alcohols. Particularly preferred herein are condensates formed by reaction of one mol of a nonyl phenol or a mixture of C_{12} - C_{18} saturated, straight-chain, aliphatic alcohols with 8-10 mols of ethylene oxide, the condensates containing an average of about 8-10 ethylene oxide groups per molecule.

In addition to use of a non-ionic detergent in the softener-detergent compositions of this invention, it is also contemplated that a relatively small amount of such a detergent can be used as a dispersing aid with an additive combination of (a) and (b). Generally, from about 5 to about 25% by weight of nonionic is used in this type of combination.

The cationic agent (a) and anti-yellowing agent (b) can also be used in conjunction with materials referred to in the detergent art as builders. These are generally alkali metal salts of weak inorganic acids. However, some strong bases and even neutral salts can be used, and are within the broad category "builders." Representative of such materials are: trisodium phosphate; tetrasodium pyrophosphate; sodium acid pyrophosphate; sodium tripolyphosphate; sodium monobasic phosphate; sodium dibasic phosphate; sodium metasilicate; sodium silicates, Na_2O/SiO_2 of 1.6/1 to 3.2/1; sodium carbonate; sodium sulfate, and borax. The potassium cation can be substituted for the sodium cation where desired and mixtures of the sodium and potassium salts are contemplated.

In addition to the components of compositions contemplated herein and recited above, still other materials can be present in the compositions. For example, brighteners can be present and are typified by stilbene, triazole and benzidine sulfone compositions. Representative of such

compositions are: sulfonated substituted triazinyl stilbene, sulfonated naphthotriazole stilbene, benzidine sulfone, etc. Preferred are stilbene and triazole combinations.

Bluing agents such as ultramarine blue can be used herein. This is a well known blue pigment occurring naturally as the mineral lapis lazuli. It can be made, for example, by igniting a mixture of kaolin, sodium carbonate or sulfate, sulfur, and carbon. It is insoluble in water, and is stable when in contact with bleaching agents, alkali and light. Details for synthetic ultramarines are given in the text: Ultramarines, Their History and Characteristics; Reckitts (Colours) Ltd., Hull, England. Preferred are micropulverized, synthetic ultramarine blues, particularly grades RS4-RS8 provided by Reckitts. The proportion of quaternary ammonium salt to ultramarine blue can range from about 10/1 to about 100/1.

The combination of ultramarine blue and alkali metal carboxymethyl cellulose provides an exceptionally fine anti-yellowing effect. This effect appears to be more pronounced than the anti-yellowing effect of either material alone.

Coloring agents and perfumes conventionally used in detergent and toiletry compositions can also be included. It is to be understood that other detergents can be present provided that the amounts are not sufficient to substantially adversely affect the desired properties. As indicated hereinafter in several of the examples, water can also be present in the compositions.

Total laundry care compositions are prepared by combining the softeners (a), anti-yellowing agents (b), and detergents with or without other components described above, and bleaching agents. The last-mentioned agents are classified broadly, for convenience, as chlorine bleaches and oxygen bleaches. Chlorine bleaches are typified by sodium hypochlorite ($NaOCl$), potassium dichloroisocyanurate (59% available chlorine), and trichloroisocyanuric acid (85% available chlorine). Oxygen bleaches are represented by sodium and potassium perborates and ~~potassium monopersulfate~~.

The proportions of components which can be present in the final product in percent by weight based on the total weight of the final product are as follows: water—about 5% to about 15% and preferably about 6.5% to about 12.5%; nonionic detergent—about 5% to about 30% and preferably about 7% to about 12%; quaternary ammonium salt—about 2% to about 8% and preferably about 4% to about 6%; alkali metal builder salts—about 30% to about 87.5% and preferably about 65% to about 85%; and alkali metal carboxymethyl cellulose—about 0.5% to about 5.33% and preferably about 1% to about 3.5%; colorants, perfumes, brighteners and bluing agents—total weight 0% to about 2% and preferably 0% to about 1%; bleaching agent—0% to about 10% and preferably 0% to about 5%.

The present invention is more fully described and exemplified in the following examples. Parts and percentages are by weight unless otherwise indicated.

Example 1

Dry blends of a softener (a) and of an anti-yellowing agent (b) were tested in a One-Towel Test. The softener was dimethyl dihydrogenated tallow quaternary ammonium chloride (95% activity) and the anti-yellowing agent was sodium carboxymethyl cellulose (74% activity).

In this One-Towel Test, one Martex brand terry cloth hand towel, size 16 inches by 26 inches, previously washed in .066% concentration of a composition containing 20% sodium dodecylbenzene sulfonate and 80% penta-sodium tripolyphosphate, rinsed and dried, is softened using the following procedure. The previously laundered terry cloth towel is placed in the bottom of a top-loading, agitator-type General Electric automatic washing machine, and 20 gallons of tap water are added at 120° F. The particular softener composition to be

tested is then added to the washing machine and the machine agitator is turned on for a ten-minute period. At the end of the ten-minute agitation period, the softening solution is automatically pumped out of the machine while the towel is spun to a damp-dry condition. The towel is subsequently subjected to a two-minute deep rinse in tap water at 80° F. and again spun to a damp-dry condition after the rinsing solution has been pumped from the machine. The towel is then line-dried at room temperature and evaluated for softness and yellowness.

The softness of the towel subjected to the foregoing test is reported in terms of values from 1 to 10 based on a tactile rating by an experienced individual. A value of 1 is assigned to a control towel which is subjected to the foregoing test in the absence of a softener composition; whereas, a value of 10 is assigned to the towel treated with softener composition A, and softness ratings of 5 to 10 are considered to be desirable. The higher the number, the greater the degree of softness. Whiteness values are determined with a Gardner color difference meter, model No. AC-1, purchased from Gardner Laboratories Inc. at Bethesda, Md., using the $+b$ scale as a measure of the yellow chromaticity. However, higher $+b$ values or whiteness numbers indicate a high amount of yellowness and poor results; whereas low $+b$ values or whiteness numbers denote less yellowness or greater whiteness and excellent results. A difference of 0.5 $+b$ unit in the test represents a difference which is visible to the eye.

Results of the tests, illustrating the use of the new additive compositions in a rinse cycle, are set forth in Table I.

TABLE I

Run. No.	Grams of Active Material		(a)/(b)	Softness Rating	Whiteness Value
	(a)	(b)			
1.....	4	-----	-----	10	+14.4
2.....	4	1	4/1	9	+13.4
3.....	4	1.25	3.2/1	8	+10.7
4.....	4	1.5	2.7/1	7	+8.2
5.....	4	2	2/1	5	+6.4
6.....	4	4	1/1	3	+5.3
7.....	-----	4	-----	1	+3.6
8.....	-----	-----	-----	1	+3.6

¹ Excellent.

² Poor.

As indicated in the tabulation, ratios of (a)/(b) from about 1.5/1 to about 4/1 are suitable for effectively minimizing yellowness while retaining good softening properties. In this series of tests, a ratio of 3.2/1 provided maximum whiteness gain while retaining desirable softness.

Example 2

In this illustration, softener granules and detergent granules were prepared independently and were then admixed to form a finished composition of distinctive character.

Softener granules:	Parts
Alcohol ¹ -ethylene oxide condensate ² -----	6
Dimethyl dihydrogenated ditallow) quaternary ammonium chloride -----	18
Pentasodium tripolyphosphate -----	63
Water -----	12
Sulpho Rhodamine B Extra 0.5% aqueous solution -----	1

Detergent granules:	Parts
Alcohol ¹ -ethylene oxide condensate ² -----	11
Sodium silicate -----	3
Sodium carboxymethyl cellulose (dry) -----	1.6
Brighteners -----	0.25
Ultramarine blue -----	0.13
Pentasodium tripolyphosphate -----	37.9
Sodium sulfate, anhydrous -----	35.9
Perfume -----	0.22
Water -----	10

¹ A mixture of saturated, straight chain aliphatic alcohols with an approximate distribution (weight) of:

	percent
C ₁₂ -----	3
C ₁₄ -----	37
C ₁₆ -----	37
C ₁₈ -----	21
C ₂₀ -----	2

² Average of 9 ethylene oxide groups per molecule.

The softener granules, pink in color, were prepared by the following procedure. The tripolyphosphate, quaternary compound, water, dye solution and the ethylene oxide condensate, in the order given, were blended in a ribbon blender. The resulting mixture was discharged into a bin after blending for five minutes. Since some heat developed during the blending, the resulting mixture was allowed to cool for about 24 hours in the bin. It was then sieved through a Stokes granulator (16 mesh). Cup weight of the sieved product is about 140-160 grams; flowability is 70-75%; and the particle size range is principally 16 to 60 mesh (U.S. Standard Sieve).

Detergent granules were formed as follows. In the order given, the components were added to a crutcher: water, sodium sulfate, sodium silicate, condensate, ultramarine blue, cellulose compound, brighteners, and phosphate. Initially, the crutcher was operated at 150 r.p.m.; however, before addition of the phosphate, it was operated at 300 r.p.m. Temperature is of the order of 150-180° F. (65-82° C.). Solids in the crutcher are about 55-60 percent. The resulting product was then sprayed in a spray tower, wherein temperatures ranged from 500-600° F. (260-316° C.). The resulting granules have a moisture content of about 10 percent. Perfume was then mixed with the granules.

Softener granules, 26.3 parts, were blended with detergent granules, 73.7 parts, in a twin-shell blender. The resulting product is speckled in appearance, predominantly blue with pink randomly distributed therewith. Properties of the product include: cup weight, 100-120 grams; flowability, 70-80%; particle size, 16-60 mesh.

Since the softener granules and the detergent granules are approximately of the same particle size distribution and flowability, segregation is minimized, and the product is non-caking and free-flowing. Also, since the softener granules are substantially dry, bleeding of the non-ionic detergent and/or of the softening agent upon aging is minimized.

When this product was used in a washing machine, it dispersed rapidly. At 120° F. (49° C.), complete solubility occurred within about 1 minute.

Example 3

Tablets of a softener-detergent composition were formed according to the following procedure.

Softener granules:	Parts
Dimethyl dihydrogenated tallow quaternary ammonium chloride (75-78% activity) ---	26.8
Nonyl phenol-ethylene oxide condensate ¹ ---	11.5
Sodium carboxymethyl cellulose, dry, 74% activity -----	3.4
Pentasodium tripolyphosphate -----	57.3
Sulpho Rhodamine B Extra, 0.5% aqueous solution -----	1

Detergent granules:

	Parts
Nonyl phenol-ethylene oxide condensate ¹ ----	12
Pentasodium tripolyphosphate -----	37
Sodium silicate, Na ₂ O/SiO ₂ =1/2.35, solids basis -----	36
Sodium hydroxide -----	3.7
Sodium carboxymethyl cellulose -----	0.6
Ultramarine blue -----	0.14
Brighteners -----	0.27
Perfume -----	0.29
Water -----	10

¹ Average of 9.5 ethylene oxide groups per molecule.

Softener granules were formed by dry blending the phosphate and cellulose compound in a blender. The cationic agent, non-ionic detergent and color were mixed, heated to dissolve the cationic agent, and the resulting molten mixture was stirred into the dry blend. Granules of softener were formed and were screened to particle size predominantly 16 to 60 mesh.

Detergent granules were formed according to the procedure given in Example 2. Granules so obtained had a moisture content of about 10 percent.

Softener granules, 22 parts, were blended with detergent granules, 65 parts. The blend was then added to a rotary drum wherein it was sprayed with a sodium silicate (Na₂O/SiO₂=1/2.35) solution, 13 parts. The silicate solution contains 44 percent solids. The resulting mixture was pressed to tablets of 0.75 inch thickness, 2.5 inches diameter. Tablet weight was about 1.5 ounces. The tablets were sprayed with water and dried to improve their strength.

The tablets have excellent strength, disperse and dissolve quickly in use. They have excellent detergent and softening activity.

TOTAL LAUNDRY CARE COMPOSITION

Example 4

Compositions having detergent, softening and bleaching capabilities, are illustrated by the following composition.

A softener-detergent combination is formed of:

	Parts
Nonyl phenol-EO condensate (Ex. 4) -----	8.8
Dimethyl dihydrogenated ditallow quaternary ammonium chloride -----	7.1
Pentasodium tripolyphosphate -----	33.1
Sodium metasilicate, anhydrous -----	41.1
Sodium carboxymethyl cellulose, 10D -----	4.7
Brightener -----	0.5
Water -----	4.7

A bleaching agent was formed by mixing together:

	Parts
Potassium dichloroisocyanurate (59% available chlorine) -----	75
Pentasodium tripolyphosphate -----	24
d-Limonene -----	1

The bleaching agent was then sealed in a water-soluble polyvinyl alcohol packet, such that the agent comprised 98.3 parts of the sealed packet and the alcohol film comprised 1.7 parts thereof.

The sealed packet was then packed in a polyvinyl alcohol container with the softener-detergent combination. The weight relationships of the finished product were:

	Parts
Softener-detergent -----	73.7
Bleach packet -----	25
Polyvinyl alcohol film -----	1.3

This product combines the advantageous functions of low sudsing detergent, fabric softener and heavy duty bleach, as well as substantial freedom from the yellowing phenomenon described above.

In a series of home-soiled laundry tests, it was determined that sodium hypochlorite was advantageous in that yellowness was reduced without sacrifice in softness. In contrast, potassium dichloroisocyanurate reduces yellowness, but causes some reduction in softness. However, the latter is advantageous because of its excellent aging stability and its availability in powdered form.

CATIONIC SOFTENER

Example 5

This illustrates the effectiveness of cationic softeners used in the compositions of this invention, and the ineffectiveness of other cationic materials.

Using a softener-detergent composition of the character described above as a base, the cationic agent was varied. Approximately the same quantity of such an agent was used in each run given below. The test used was the One-Towel Test. Results are given in Table II, following.

TABLE II

Run No.	Cationic Agent	Softness Rating
1.....	Dimethyl dihydrogenated ditallow quaternary ammonium chloride.	10
2.....	Stearyl dimethyl benzyl q.a.c. ^a -----	5
3.....	Alkyl methyl benzyl q.a.c. ¹ -----	4
4.....	N-methyl diethanolamine distearate benzyl chloride.	3
5.....	Dodecyl trimethyl q.a.c.-----	2
6.....	Cetyl pyridinium chloride-----	2
7.....	Cetyl trimethyl ammonium bromide-----	2
8.....	p-Diisobutylphenoxymethoxyethyl dimethyl benzyl q.a.c.-----	1
9.....	(Control)-----	1

^a=42 parts of alkyl¹ dimethyl benzyl q.a.c., 8 parts of dialkyl¹ methyl benzyl q.a.c., 50 parts of inert.

¹=60% C₁₄, 30% C₁₆, 5% C₁₈, 5% C₂₀.

Example 6

The softening and whitening properties of a number of softener compositions containing various known soil-suspending agents were evaluated as described herein:

(a) *Softener compositions*.—The softener compositions evaluated are listed in Table III:

TABLE III

	Materials	Parts
Composition:		
A.....	Softener ^a -----	4
	(Softener ^a -----)	4
B.....	Sodium carboxymethyl cellulose (NaCMC) ^b -----	2
C.....	Softener ^a -----	4
	(Polyvinyl alcohol (PVA)) ^c -----	2
D.....	Softener ^a -----	4
	(Polyvinylpyrrolidone (PVP)) ^d -----	2
E.....	Softener ^a -----	4
	Copolymer of vinylpyrrolidone and vinylacetate (PVP/VA) ^e -----	2

^a Dimethyl dihydrogenated tallow quaternary ammonium chloride.

^b Sodium carboxymethyl cellulose containing 74% active material.

^c Polyvinyl alcohol having a viscosity of 1.8–3 centipoises in 4% aqueous solution and a polyvinyl acetate content within a range of 10 to 30%.

^d Polyvinylpyrrolidone having an average molecular weight of approximately 40,000.

^e Copolymer of vinylpyrrolidone and vinyl acetate having a 60/40 ratio of vinylpyrrolidone to vinyl acetate and an average molecular weight within the range of about 40,000 to 100,000.

The compositions were prepared by admixing the solid ingredients in the stated proportions.

(b) *Test procedures*.—The softening and whitening properties of compositions A through E were evaluated using the One-Towel Test described above.

(c) *Test results*.—The results of the tests are presented in Table IV below. The column percent Reduction in Yellowing is determined by subtracting the +b value for the composition containing an anti-yellowing ingredient from the +b value for composition A and dividing by

the difference in $+b$ value between composition A and the control; e.g., based on compositions B

$$[(7.0-4.7) \div (7.0-2.5)] \times 100\% = \frac{2.3}{4.5} \times 100\% = 51\%$$

TABLE IV

Composition:	Tested as Anti-yellowing Agent	Softness Rating	Whiteness ($+b$ value)	Percent Reduction in Yellowing
A	None	10	7.0	51
B	NaCMC	9	4.7	0
C	PVA	10	7.3	0
D	PVP	10	7.0	0
E	PVP/MA	10	6.9	2
Control			2.5	

Example 7

The softening and whitening properties of a number of softener compositions were evaluated as described herein:

(a) *Softener compositions.*—The softener compositions evaluated are listed in Table V:

TABLE V

Composition:	Materials	Parts
I	Dimethyl dihydrogenated tallow quaternary ammonium chloride (Softener A).	4
II	(Softener A) (Sodium carboxymethylcellulose (NaCMC))	2
III	NaCMC Condensation product of C_{12} - C_{18} alcohol with 9 moles of ethylene oxide (Non-ionic).	2
IV	(Softener A) NaCMC Sodium tripolyphosphate (NaTPP)	4
V	NaCMC Nonionic NaTPP	4
VI	(Softener A) NaCMC Nonionic NaTPP	4
VII	Potassium dichloroisocyanurate bleach (bleach).	10
VIII	(Softener A) NaCMC	4
IX	Diocto dimethyl quaternary ammonium chloride (Softener B).	4
X	(Softener B) NaCMC	4
XI	Dihydrogenated tallow dimethyl quaternary ammonium methyl sulfate (Softener C).	2.67
XII	(Softener C) NaCMC	4
XIII	Dihydrogenated tallow dimethyl quaternary ammonium bromide (Softener D).	2.67
XIV	(Softener D) NaCMC	4
XV	(Softener D) Potassium carboxymethyl cellulose (KCMC)	2
XVI	(Softener A) KCMC	4

The compositions were prepared by admixing the solid ingredients in the stated proportions.

(b) *Test procedures.*—The softening and whitening properties of compositions I through XVI were evaluated using the One-Towel Test described above.

(c) *Test results.*—The results of the tests are presented in Tables VI and VII below. The column percent Reduction in Yellowing is determined by subtracting the $+b$ value for the composition containing an anti-yellowing ingredient from the $+b$ value for the same composition containing softener alone and dividing by the differ-

ence in $+b$ value between the composition containing softener only and the control run in water alone; e.g., based on composition II

$$[(7.4-4.2) \div (7.4-2.4)] \times 100\% = \frac{3.2}{5.0} \times 100\% = 64\%$$

TABLE VI

Composition:	Ingredients	Softness Rating	Percent Reduction in Yellowing
I	Softener A	10	64
II	Softener A plus NaCMC	9	58
III	Softener A plus NaCMC plus nonionic.	8	41
IV	Softener A plus NaCMC plus NaTPP.	9	72
V	Softener A plus NaCMC plus nonionic plus NaTPP.	9	84
VI	Softener A plus NaCMC plus nonionic plus NaTPP plus bleach.		

TABLE VII

Composition:	Ingredients	Softness Rating	Percent Reduction in Yellowing
VII	Softener A	10	64
VIII	Softener A plus NaCMC	9	5
IX	Softener B	9	32
X	Softener B plus NaCMC	7	63
XI	Softener C	8	67
XII	Softener C plus NaCMC	10	59
XIII	Softener D	9	29
XIV	Softener D plus NaCMC		
XV	Softener D plus KCMC		
XVI	Softener A plus KCMC		

The new compositions can be packaged in paper, plastic, or any other suitable packaging medium. For example, an additive composition of a cationic agent (a) and an anti-yellowing agent (b) can be packaged in a water-soluble plastic material such as polyvinyl alcohol, for use either in a wash or a rinse cycle, or in both cycles. It has been found that total laundry care compositions containing a bleach are most effective when the bleach is segregated from other ingredients. In this way decomposition is avoided and greater shelf life of a product is realized. Thus, the bleach can be contained in a water-soluble polyvinyl alcohol packet and all other ingredients can be combined in the container which also includes the bleach packet. Another technique contemplated for insuring long shelf life of a total laundry care involves coating of a bleaching agent with a fatty alcohol such as stearyl alcohol; the coated bleaching agent can then be mixed with all other ingredients without necessity for separated compartments in a container.

It is to be understood, in keeping with the illustrations given above, that the additive compositions, etc. of this invention can be in solid form in the character of free-flowing powders, granules, tablets and solution. By the term "solids" used herein, it is intended to include sizes and shapes of material having at least one dimension of relatively low order, such as grains, chips, flakes and other forms having proportionately large surface areas.

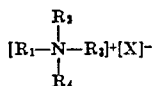
Performance of the compositions of this invention is excellent. Advantages realized therewith include: softer, fluffier towels and diapers—whether dryer-dried or line-dried; smoother, silkier sheets and pillow cases; easier-to-iron shirts and sheets reduced static cling on nylon and other synthetics; longer garment life; less wrinkling.

The new compositions can be used to launder a variety of fabrics, which can be made from natural animal fibers, natural vegetable fibers, mineral fibers and synthetic fibers.

These include wool, silk, cotton, linen, glass, acetate, rayon, and nylon. The fabrics can be those classified as outer garments, under garments and diapers.

I claim:

1. A composition consisting essentially of
 - (a) a quaternary ammonium textile softener tending to yellow textile materials upon treatment in water containing colored colloidal particles, and represented by the general formula



wherein R_1 and R_2 are alkyl groups each containing from 1 to 3 carbon atoms, R_3 and R_4 are alkyl groups each containing from 12 to 22 carbon atoms, and X is selected from the group consisting of chlorine, bromine, and methyl sulfate; and

- (b) an alkali metal carboxymethyl cellulose wherein the alkali metal is selected from the group consisting of sodium and potassium; the weight ratio of (a)/(b) being from about 1.5/1 to about 4/1 and sufficient to inhibit said yellowing effect.
2. A composition defined by claim 1 wherein R_1 and R_2 are methyl.
3. A composition defined by claim 1 wherein R_3 and R_4 are hydrogenated tallow groups.
4. A composition defined by claim 1 wherein X is chlorine.
5. A composition defined by claim 1 wherein (a) is dimethyl dihydrogenated ditallow quaternary ammonium chloride.
6. A composition defined by claim 1 wherein (b) is sodium carboxymethyl cellulose.
7. A composition defined by claim 1 which contains ultramarine blue, the proportion of (a) to ultramarine blue being about 10/1 to about 100/1.
8. A detergent composition consisting essentially of:
 - (a) about 2% to about 8% of a quaternary ammonium salt as defined in claim 1;
 - (b) about 0.5% to about 5.33% of an alkali metal carboxymethyl cellulose wherein the alkali metal is selected from the group consisting of sodium and potassium, the weight ratio of (a) to (b) being from about 1.5/1 to about 4/1 and sufficient to inhibit the

yellowing effect resulting from the tendency of the quaternary ammonium softener to yellow textile materials upon treatment in water containing colored colloidal particles;

- (c) about 5% to about 30% of a water soluble non-ionic detergent having a hydrophobic group of 8 to 30 carbon atoms condensed with 5 to 30 mols of ethylene oxide;
 - (d) about 30% to about 87.5% of at least one alkali metal inorganic builder salt wherein the alkali metal is selected from the group consisting of sodium and potassium; and
 - (e) about 5% to about 15% of water; wherein said percentages are by weight based on the total weight of the detergent composition.
9. The detergent composition as defined in claim 8 wherein the quaternary ammonium salt is present in an amount of about 4.0% to about 6%; the alkali metal carboxymethyl cellulose is present in an amount of about 1% to about 3.5%; the nonionic detergent is present in an amount of about 7% to about 12%; the alkali metal inorganic builder salt is present in an amount of about 65% to about 85%; and water is present in an amount of about 6.5% to about 12.5%.
10. The detergent composition as defined in claim 8 wherein a bleaching agent selected from the group consisting of chlorine bleaches and oxygen bleaches is present in an amount of 0% to about 10%.
11. The detergent composition as defined in claim 10 wherein the bleaching agent is present in an amount of no more than 5%.

References Cited

UNITED STATES PATENTS

2,708,157	5/1955	Houser	252—109 X
2,995,523	8/1961	Germann	252—137
3,033,704	5/1962	Sherrill et al.	252—106 X
3,044,962	7/1962	Brunt et al.	252—106 X
3,058,916	10/1962	Sinner et al.	252—99
3,122,502	2/1964	Waldman et al.	252—8.8
3,186,869	6/1965	Friedman	252—90 X
3,213,028	10/1965	Wood	252—152 X

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