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(54) **Fabric softener compositions**

(57) There is provided a fabric softener composition which is free of cellulase and which comprises:

- i) from 1% to 80% by weight of a fabric softener compound,
- ii) from 10ppm to 0.5% by weight of a heavy metal ion sequestrant, and

said composition comprises a component selected from a dye, a perfume, a fatty acid compound of Iodine Value (IV) of at least 2, a compound having one or more fatty acid moieties of Iodine value (IV) of at least 2, and mixtures thereof.

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DescriptionField of the invention

5 The present invention relates to fabric softener compositions having enhanced storage stability. More particularly, the present invention relates to a fabric softening composition comprising a fabric softening component, a heavy metal ion sequestrant and a component selected from a dye, a perfume, a compound having a fatty acid moiety of Iodine Value (IV) of at least 2 and mixtures thereof.

10 Background of the invention

Fabric softening compositions are known in the art and have been widely used by consumers during the rinse cycles of laundry operations. However, consumer acceptance of such compositions is determined not only by the performance achieved with these products but also by the aesthetics associated therewith. The perfume systems as well as the dye systems are therefore an important aspect of the successful formulation of such commercial products.

Of these, products which contain a high level of perfume relative to the total amount of fabric softening actives present within the composition are most preferred.

The Applicant has now found that a problem encountered with fabric softening compositions is that of the degradation upon storage of sensitive components selected from perfumes, dyes, fatty acids of Iodine Value (IV) of at least 2, compounds having one or more fatty acid moieties of IV of at least 2.

Indeed, fatty acids of IV of at least 2 and/or fatty acids compounds having fatty acid moiety of IV of at least 2 which include components such as N,N-di(tallowyl-oxy-ethyl)-N,N-dimethyl ammonium chloride have been observed to degrade upon storage, resulting in a performance loss together with a strong odour characteristic of the degradation. In general, the higher the IV value, the higher the degradation.

25 Not to be bound by theory, we believe that we have found that this problem of sensitive components degradation is related to the presence of heavy metal ions. Indeed, we believe that the presence of heavy metal ion compounds as impurities within the fabric softening composition catalyse, upon storage, oxidative processes of some sensitive softening composition ingredients such as dyes, perfumes and compounds having fatty acid moiety of IV of at least 2. The presence of such heavy metal ions may be provided by the fabric softener raw materials and/or from the metal hardware used for processing and/or for storage of the fabric softening composition.

The Applicant has now found that the provision of a heavy metal ion sequestrant present at low levels overcomes the problem.

Co-pending application PCT/US95/05267 discloses a fabric softening composition comprising a fabric softening agent, a cellulase and a chelant wherein said chelant is present in amount of 10ppm to 0.5% by weight of the composition.

It is therefore an object of the invention to provide fabric softening composition which exhibit excellent storage stability especially with regard to the dye and/or perfume and/or fatty acids of IV of at least 2 and/or compounds having fatty acid moiety of IV of at least 2.

40 The Iodine Value herein described (IV) is a method well known in the art for measuring the degree of unsaturation of a fatty acid compound or a fatty acid moiety. This is measured by titration of Iodine whereby the number of Iodine molecule which have disappeared is proportional to the number of unsaturation of the fatty acid compound or moiety.

Summary of the invention

45 There is provided a fabric softener composition which is free of cellulase and which comprises:

- i) -from 1% to 80% by weight of a fabric softener compound,
- ii) -from 10ppm to 0.5% by weight of a heavy metal ion sequestrant, and said composition comprises a component selected from a dye, a perfume, a fatty acid compound of Iodine Value (IV) of at least 2, a compound having one or more fatty acid moieties of Iodine value (IV) of at least 2, and mixtures thereof.

Detailed description of the inventionFabric softening compound

55 An essential component of the invention is a fabric softening compound.

Fabric softening compositions, in particular fabric softening compositions to be used in the rinse cycle of laundry washing processes, are well known.

Compositions of the present invention preferably comprise from 1 to 80% by weight of fabric softening active, more

preferably from 2 to 70% by weight, most preferably from 5 to 50% by weight of the composition.

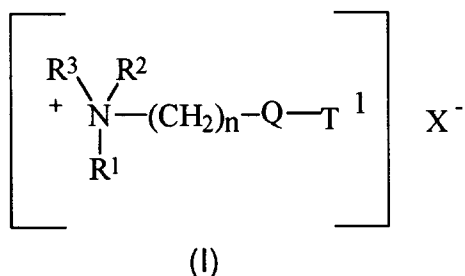
Conventional fabric softening materials may be used. These may be selected from cationic fabric softening materials such as di-long alkyl chain ammonium chloride and biodegradable fabric softening materials, nonionic, amphoteric or anionic fabric softening material. Disclosure of such materials may be found in US 4,327,133; 4,421,792; 4,426,299; 4,460,485; 3,644,203 and 4,661,269.

Preferred fabric softening materials are biodegradable quaternary ammonium compounds contain long chain alk(en)yl groups interrupted by functional groups such as carboxy groups.

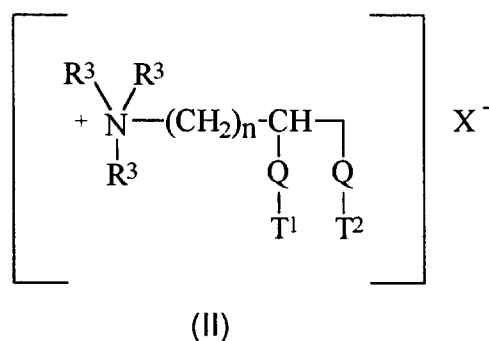
Said materials and fabric softening compositions containing them are disclosed in numerous publications such as EPA 040 562, and EPA 239 910.

In EPA 239 910 is disclosed that a pH range of from 2.5 to 4.2 provides optimum storage stability to said rapidly biodegradable ammonium compounds.

The quaternary ammonium compounds and amine precursors herein have the formula (I) or (II), below :



or



Q is selected from -O-C(O)-, -C(O)-O-, -O-C(O)-O-, -NR⁴-C(O)-, -C(O)-NR⁴-;

R¹ is (CH₂)_n-Q-T² or T³;

R² is (CH₂)_m-Q-T⁴ or T⁵ or R³;

R³ is C₁-C₄ alkyl or C₁-C₄ hydroxyalkyl or H;

R⁴ is H or C₁-C₄ alkyl or C₁-C₄ hydroxyalkyl;

T¹, T², T³, T⁴, T⁵ are independently C₁₁-C₂₂ alkyl or alkenyl;

n and m are integers from 1 to 4; and

X⁻ is a softener-compatible anion.

Non-limiting examples of softener-compatible anions include chloride or methyl sulfate.

The alkyl, or alkenyl, chain T¹, T², T³, T⁴, T⁵ must contain at least 11 carbon atoms, preferably at least 16 carbon atoms. The chain may be straight or branched.

Tallow is a convenient and inexpensive source of long chain alkyl and alkenyl material. The compounds wherein T¹, T², T³, T⁴, T⁵ represents the mixture of long chain materials typical for tallow are particularly preferred.

Specific examples of quaternary ammonium compounds suitable for use in the aqueous fabric softening compositions herein include :

- 1) N,N-di(tallowyl-oxy-ethyl)-N,N-dimethyl ammonium chloride;
- 2) N,N-di(tallowyl-oxy-ethyl)-N-methyl, N-(2-hydroxyethyl);
- 3) N,N-di(2-tallowyl-oxy-2-oxo-ethyl)-N,N-dimethyl ammonium chloride;
- 4) N,N-di(2-tallowyl-oxyethylcarbonyloxyethyl)-N,N-dimethyl ammonium chloride;
- 5) N-(2-tallowyl-oxy-2-ethyl)-N-(2-tallowyloxy-2-oxo-ethyl)-N,N-dimethyl ammonium chloride;
- 6) N,N,N-tri(tallowyl-oxy-ethyl)-N-methyl ammonium chloride;
- 7) N-(2-tallowyl-oxy-2-oxoethyl)-N-(tallowyl-N,N-dimethyl-ammonium chloride; and
- 8) 1,2-ditallowyl-oxy-3-trimethylammonio propane chloride; and mixtures of any of the above materials.

Of these, compounds 1-7 are examples of compounds of Formula (I); compound 8 is a compound of Formula (II). Particularly preferred is N,N-di(tallowyl-oxy-ethyl)-N,N-dimethyl ammonium chloride, where the tallow chains are at least partially unsaturated.

The level of unsaturation of the tallow chain can be measured by the Iodine Value (IV) of the corresponding fatty acid, which in the present case should preferably be in the range of from 5 to 100 with two categories of compounds being distinguished, having a IV below or above 25.

Indeed, for compounds of Formula (I) made from tallow fatty acids having a IV of from 5 to 25, preferably 15 to 20, it has been found that a cis/trans isomer weight ratio greater than 30/70, preferably greater than 50/50 and more preferably greater than 70/30 provides optimal concentrability.

For compounds of Formula (I) made from tallow fatty acids having a IV of above 25, the ratio of cis to trans isomers has been found to be less critical unless very high concentrations are needed.

Other examples of suitable quaternary ammoniums of Formula (I) and (II) are obtained by, e.g. :

- replacing "tallow" in the above compounds with, for example, coco, palm, lauryl, oleyl, ricinoleyl, stearyl, palmityl, or the like, said fatty acyl chains being either fully saturated, or preferably at least partly unsaturated;
- replacing "methyl" in the above compounds with ethyl, ethoxy, propyl, propoxy, isopropyl, butyl, isobutyl or t-butyl;
- replacing "chloride" in the above compounds with bromide, methylsulfate, formate, sulfate, nitrate, and the like.

In fact, the anion is merely present as a counterion of the positively charged quaternary ammonium compounds. The nature of the counterion is not critical at all to the practice of the present invention. The scope of this invention is not considered limited to any particular anion.

By "amine precursors thereof" is meant the secondary or tertiary amines corresponding to the above quaternary ammonium compounds, said amines being substantially protonated in the present compositions due to the claimed pH values.

For the preceding biodegradable fabric softening agents, the pH of the compositions herein is an essential parameter of the present invention. Indeed, it influences the stability of the quaternary ammonium or amine precursors compounds, especially in prolonged storage conditions.

The pH, as defined in the present context, is measured in the neat compositions at 20°C. For optimum hydrolytic stability of these compositions, the neat pH, measured in the above-mentioned conditions, must be in the range of from 2.0 to 4.5. Preferably, where the liquid fabric softening compositions of the invention are in a concentrated form, the pH of the neat composition is in the range of 2.0 to 3.5, while if it is in a diluted form, the pH of the neat composition is in the range of 2.0 to 3.0. The pH of these compositions herein can be regulated by the addition of a Bronsted acid.

Examples of suitable acids include the inorganic mineral acids, carboxylic acids, in particular the low molecular weight (C₁-C₅) carboxylic acids, and alkylsulfonic acids. Suitable inorganic acids include HCl, H₂SO₄, HNO₃ and H₃PO₄. Suitable organic acids include formic, acetic, citric, methylsulfonic and ethylsulfonic acid. Preferred acids are citric, hydrochloric, phosphoric, formic, methylsulfonic acid, and benzoic acids.

The quaternary ammonium or amine precursors compounds herein are present at levels of from 1% to 80% of compositions herein, depending on the composition execution which can be dilute with a preferred level of active biodegradable fabric softening components from 1% to 5%, or concentrated, with a preferred level of active biodegradable fabric softening components from 5% to 80%, more preferably 10% to 50%, most preferably 15% to 35% by weight.

Softening agents also useful in the present invention compositions are nonionic fabric softener materials, preferably in combination with cationic softening agents. Typically, such nonionic fabric softener materials have a HLB of from 2 to 9, more typically from 3 to 7. Such nonionic fabric softener materials tend to be readily dispersed either by themselves, or when combined with other materials such as single-long-chain alkyl cationic surfactant described in detail hereinafter. Dispersibility can be improved by using more single-long-chain alkyl cationic surfactant, mixture with other materials as set forth hereinafter, use of hotter water, and/or more agitation. In general, the materials selected should be relatively crystalline, higher melting, (e.g. >40°C) and relatively water-insoluble.

The level of optional nonionic softener in the compositions herein is typically from 0.1% to 10%, preferably from 1% to 5%.

Preferred nonionic softeners are fatty acid partial esters of polyhydric alcohols, or anhydrides thereof, wherein the

alcohol, or anhydride, contains from 2 to 18, preferably from 2 to 8, carbon atoms, and each fatty acid moiety contains from 12 to 30, preferably from 16 to 20, carbon atoms. Typically, such softeners contain from one to 3, preferably 2 fatty acid groups per molecule.

The polyhydric alcohol portion of the ester can be ethylene glycol, glycerol, poly (e.g., di-, tri-, tetra, penta-, and/or hexa-) glycerol, xylitol, sucrose, erythritol, pentaerythritol, sorbitol or sorbitan. Sorbitan esters and polyglycerol monostearate are particularly preferred.

The fatty acid portion of the ester is normally derived from fatty acids having from 12 to 30, preferably from 16 to 20, carbon atoms, typical examples of said fatty acids being lauric acid, myristic acid, palmitic acid, stearic acid, oleic and behenic acid.

Highly preferred optional nonionic softening agents for use in the present invention are the sorbitan esters, which are esterified dehydration products of sorbitol, and the glycerol esters.

Commercial sorbitan monostearate is a suitable material. Mixtures of sorbitan stearate and sorbitan palmitate having stearate/palmitate weight ratios varying between 10:1 and 1:10, and 1,5-sorbitan esters are also useful.

Glycerol and polyglycerol esters, especially glycerol, diglycerol, triglycerol, and polyglycerol mono- and/or di-esters, preferably mono-, are preferred herein (e.g. polyglycerol monostearate with a trade name of Radiasurf 7248).

Useful glycerol and polyglycerol esters include mono-esters with stearic, oleic, palmitic, lauric, isostearic, myristic, and/or behenic acids and the diesters of stearic, oleic, palmitic, lauric, isostearic, behenic, and/or myristic acids. It is understood that the typical mono-ester contains some di- and tri-ester, etc.

The "glycerol esters" also include the polyglycerol, e.g., diglycerol through octaglycerol esters. The polyglycerol polyols are formed by condensing glycerin or epichlorohydrin together to link the glycerol moieties via ether linkages. The mono- and/or diesters of the polyglycerol polyols are preferred, the fatty acyl groups typically being those described hereinbefore for the sorbitan and glycerol esters.

Additional fabric softening agents useful herein are described in U.S. 4,661,269; U.S. 4,439,335; and in U.S. 3,861,870; US 4,308,151; US 3,886,075; US 4,233,164; US 4,401,578; US 3,974,076; US 4,237,016; and EP 472,178.

For example, suitable fabric softener agents useful herein may comprise one, two, or all three of the following fabric softening agents:

(a) the reaction product of higher fatty acids with a polyamine selected from hydroxyalkylalkylenediamines and dialkylenetriamines and mixtures thereof (preferably from 10% to 80%); and/or

(b) cationic nitrogenous salts containing only one long chain acyclic aliphatic C₁₅-C₂₂ hydrocarbon group (preferably from 3% to 40%); and/or

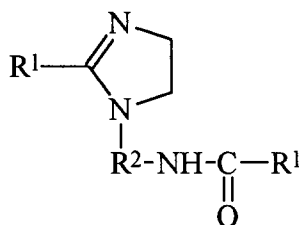
(c) cationic nitrogenous salts having two or more long chain acyclic aliphatic C₁₅-C₂₂ hydrocarbon groups or one said group and an arylalkyl group (preferably from 10% to 80%);

with said (a), (b) and (c) preferred percentages being by weight of the fabric softening agent component of the present invention compositions.

Following are the general descriptions of the preceding (a), (b), and (c) softener ingredients (including certain specific examples which illustrate, but do not limit the present invention).

Component (a): Softening agents (actives) of the present invention may be the reaction products of higher fatty acids with a polyamine selected from hydroxyalkylalkylenediamines and dialkylenetriamines and mixtures thereof. These reaction products are mixtures of several compounds in view of the multi-functional structure of the polyamines.

The preferred Component (a) is a nitrogenous compound selected from the reaction product mixtures or some selected components of the mixtures. More specifically, the preferred Component (a) is compounds selected from substituted imidazoline compounds having the formula:



wherein R¹ is an acyclic aliphatic C₁₅-C₂₁ hydrocarbon group and R² is a divalent C₁-C₃ alkylene group.

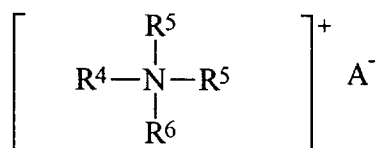
Component (a) materials are commercially available as: Mazamide[®] 6, sold by Mazer Chemicals, or Ceranine[®] HC, sold by Sandoz Colors & Chemicals; stearic hydroxyethyl imidazoline sold under the trade names of Alkazine[®] ST by Alkaril Chemicals, Inc., or Schercozoline[®] S by Scher Chemicals, Inc.; N,N"-ditallowalkoyldiethylenetriamine; 1 - tal-lowamidoethyl - 2 - tallowimidazoline (wherein in the preceding structure R¹ is an aliphatic C₁₅-C₁₇ hydrocarbon group

and R² is a divalent ethylene group).

Certain of the Components (a) can also be first dispersed in a Bronsted acid dispersing aid having a pKa value of not greater than 4; provided that the pH of the final composition is not greater than 5. Some preferred dispersing aids are hydrochloric acid, phosphoric acid, or methylsulfonic acid.

Both N,N"-ditallowalkoyldiethylenetriamine and 1-tallow(amidoethyl)-2-tallowimidazoline are reaction products of tallow fatty acids and diethylenetriamine, and are precursors of the cationic fabric softening agent methyl-1-tallowamidoethyl-2-tallowimidazolinium methylsulfate (see "Cationic Surface Active Agents as Fabric Softeners," R. R. Egan, Journal of the American Oil Chemicals' Society, January 1978, pages 118-121). N,N"-ditallowalkoyldiethylenetriamine and 1-tallowamidoethyl-2-tallowimidazoline can be obtained from Witco Chemical Company as experimental chemicals. Methyl-1-tallowamidoethyl-2-tallowimidazolinium methylsulfate is sold by Witco Chemical Company under the tradename Varisoft® 475.

Component (b): The preferred Component (b) is a cationic nitrogenous salt containing one long chain acyclic aliphatic C₁₅-C₂₂ hydrocarbon group, preferably selected from acyclic quaternary ammonium salts having the formula:



wherein R⁴ is an acyclic aliphatic C₁₅-C₂₂ hydrocarbon group, R⁵ and R⁶ are C₁-C₄ saturated alkyl or hydroxy alkyl groups, and A⁻ is an anion.

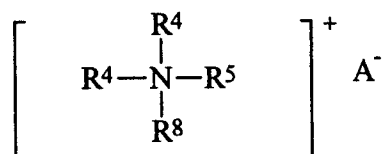
Examples of Component (b) are the monoalkyltrimethylammonium salts such as monotallowtrimethylammonium chloride, mono (hydrogenated tallow) trimethylammonium chloride, palmityltrimethyl ammonium chloride and soyatri-methylammonium chloride, sold by Sherex Chemical Company under the trade name Adogen® 471, Adogen® 441, Adogen® 444, and Adogen® 415, respectively. In these salts, R⁴ is an acyclic aliphatic C₁₆-C₁₈ hydrocarbon group, and R⁵ and R⁶ are methyl groups. Mono (hydrogenated tallow) trimethylammonium chloride and monotallowtrimethyl-ammonium chloride are preferred.

Other examples of Component (b) are behenyltrimethylammonium chloride wherein R⁴ is a C₂₂ hydrocarbon group and sold under the trade name Kemamine® Q2803-C by Humko Chemical Division of Witco Chemical Corporation; soyadimethylethylammonium ethylsulfate wherein R⁴ is a C₁₆-C₁₈ hydrocarbon group, R⁵ is a methyl group, R⁶ is an ethyl group, and A⁻ is an ethylsulfate anion, sold under the trade name Jordaquat® 1033 by Jordan Chemical Company; and methyl-bis(2-hydroxyethyl)-octadecylammonium chloride wherein R⁴ is a C₁₈ hydrocarbon group, R⁵ is a 2-hydrox-yethyl group and R⁶ is a methyl group and available under the trade name Ethoquad® 18/12 from ArmaK Company.

Other examples of Component (b) are 1-ethyl-1-(2-hydroxy ethyl)-2-isoheptadecylimidazolinium ethylsulfate, avail-able from Mona Industries, Inc. under the trade name Monaquato® ISIES; mono(tallowoxyloxyethyl) hydroxyethyl-dimethylammonium chloride, i.e., monoester of tallow fatty acid with di(hydroxyethyl)dimethylammonium chloride, a by-product in the process of making diester of tallow fatty acid with di(hydroxyethyl)dimethylammonium chloride, i.e., di(tal-lowoxyloxyethyl)dimethylammonium chloride.

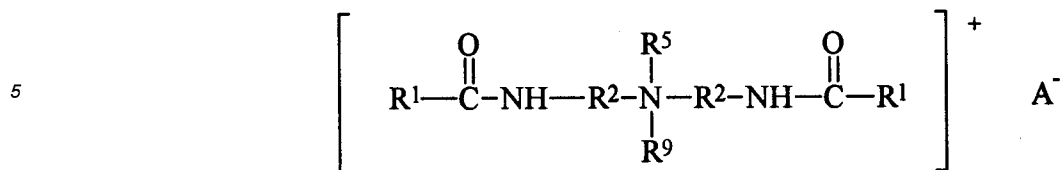
Component (c): Preferred cationic nitrogenous salts having two or more long chain acyclic aliphatic C₁₅-C₂₂ hydro-carbon groups or one said group and an arylalkyl group which can be used either alone or as part of a mixture are selected from the group consisting of:

(i) acyclic quaternary ammonium salts having the formula:



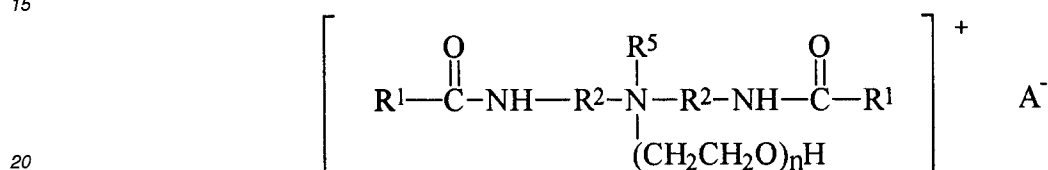
wherein R⁴ is an acyclic aliphatic C₁₅-C₂₂ hydrocarbon group, R⁵ is a C₁-C₄ saturated alkyl or hydroxyalkyl group, R⁸ is selected from R⁴ and R⁵ groups, and A⁻ is an anion defined as above;

(ii) diamido quaternary ammonium salts having the formula:



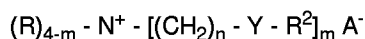
wherein R¹ is an acyclic aliphatic C₁₅-C₂₁ hydrocarbon group, each R² is the same or different divalent alkylene group having 1 to 3 carbon atoms, R⁵ and R⁹ are C₁-C₄ saturated alkyl or hydroxyalkyl groups, and A⁻ is an anion;

(iii) diamino alkoxyated quaternary ammonium salts having the formula:



wherein n is equal to 1 to 5, and R¹, R², R⁵ and A⁻ are as defined above;

(iv) diester quaternary ammonium (DEQA) compounds having the formula:



wherein

each Y = -O-(O)C-, or -C(O)-O-;

m = 2 or 3;

each n = 1 to 4;

each R substituent is a short chain C₁-C₆, preferably C₁-C₃ alkyl or hydroxyalkyl group, e.g., methyl (most preferred), ethyl, propyl, hydroxyethyl, and the like, benzyl, or mixtures thereof;

each R² is a long chain C₁₀-C₂₂ hydrocarbonyl, or substituted hydrocarbonyl substituent, preferably C₁₅-C₁₉ alkyl and/or alkenyl, most preferably C₁₅-C₁₈ straight chain alkyl and/or alkenyl; and

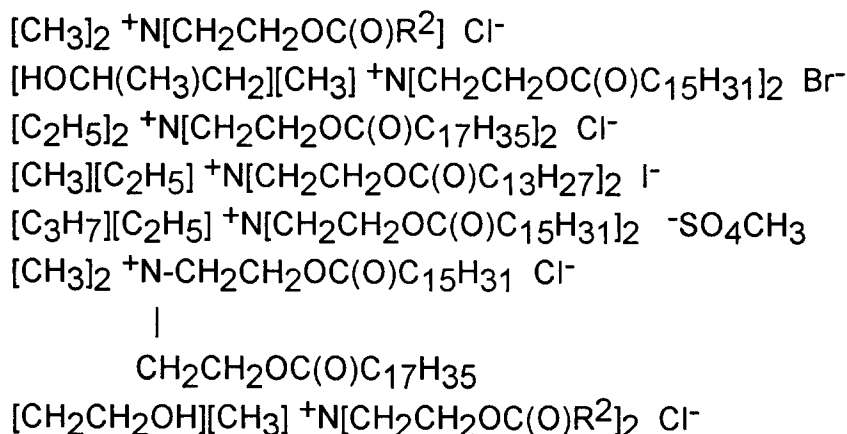
the counterion, A⁻, can be any softener-compatible anion, for example, chloride, bromide, methylsulfate, formate, sulfate, nitrate and the like; and

(v) mixtures thereof.

Examples of Component (c) are the well-known dialkyldi methylammonium salts such as ditallowdimethylammonium chloride, ditallowdimethylammonium methylsulfate, di (hydrogenatedtallow) dimethylammonium chloride, distearyldimethylammonium chloride, dibehenyldimethylammonium chloride. Di(hydrogenatedtallow)di methylammonium chloride and ditallowdimethylammonium chloride are preferred. Examples of commercially available dialkyldimethyl ammonium salts usable in the present invention are di(hydrogenatedtallow)dimethylammonium chloride (trade name Adogen[®] 442), ditallowdimethylammonium chloride (trade name Adogen[®] 470), distearyl dimethylammonium chloride (trade name Arosurf[®] TA-100), all available from Witco Chemical Company. Dibehenyldimethylammonium chloride is sold under the trade name Kemamine Q-2802C by Humko Chemical Division of Witco Chemical Corporation.

Other examples of Component (c) are methylbis(tallowamidoethyl)(2-hydroxyethyl)ammonium methylsulfate and methylbis(hydrogenated tallowamidoethyl)(2-hydroxyethyl)ammonium methylsulfate; these materials are available from Witco Chemical Company under the trade names Varisoft[®] 222 and Varisoft[®] 110, respectively; dimethylstearylbenzyl ammonium chloride sold under the trade names Varisoft[®] SDC by Witco Chemical Company and Ammonyx[®] 490 by Onyx Chemical Company; 1-methyl-1-tallowamidoethyl-2-tallowimidazolinium methylsulfate and 1-methyl-1-(hydrogenatedtallowamidoethyl)-2-(hydrogenatedtallow)imidazolinium methylsulfate; they are sold under the trade names Varisoft[®] 475 and Varisoft[®] 445, respectively, by Witco Chemical Company.

The following are also non-limiting examples of Component (c) (wherein all long-chain alkyl substituents are straight-chain):



where $-\text{C}(\text{O})\text{R}^2$ is derived from soft tallow and/or hardened tallow fatty acids. Especially preferred is diester of soft and/or hardened tallow fatty acids with di(hydroxyethyl)dimethylammonium chloride, also called di(tallowoyloxyethyl)dimethylammonium chloride.

Since the foregoing compounds (diesters) are somewhat labile to hydrolysis, they should be handled rather carefully when used to formulate the compositions herein. For example, stable liquid compositions herein are formulated at a pH in the range of 2 to 5, preferably from 2 to 4.5, more preferably from 2 to 4. The pH can be adjusted by the addition of a Bronsted acid. Ranges of pH for making stable softener compositions containing diester quaternary ammonium fabric softening compounds are disclosed in U.S. 4,767,547.

These types of compounds and general methods of making them are disclosed in U.S. 4,137,180.

A preferred composition contains Component (a) at a level of from 10% to 80%, Component (b) at a level of from 3% to 40%, and Component (c) at a level of from 10% to 80%, by weight of the fabric softening component of the present invention compositions.

An even more preferred composition contains Component (a): the reaction product of 2 moles of hydrogenated tallow fatty acids with 1 mole of N-2-hydroxyethylethylenediamine and is present at a level of from 20% to 70% by weight of the fabric softening component of the present invention compositions; Component (b): mono(hydrogenated tallow)trimethyl ammonium chloride present at a level of from 3% to 30% by weight of the fabric softening component of the present invention compositions; Component (c): selected from di(hydrogenated tallow)dimethylammonium chloride, ditallowdimethylammonium chloride, methyl-1-tallowamidoethyl-2-tallowimidazolinium methylsulfate, diethanol ester dimethylammonium chloride, and mixtures thereof; wherein Component (c) is present at a level of from 20% to 60% by weight of the fabric softening component of the present invention compositions; and wherein the weight ratio of said di(hydrogenated tallow)dimethylammonium chloride to said methyl-1-tallowamidoethyl-2-tallowimidazolinium methylsulfate is from 2:1 to 6:1.

In the cationic nitrogenous salts described hereinbefore, the anion A⁻ provides charge neutrality. Most often, the anion used to provide charge neutrality in these salts is a halide, such as chloride or bromide. However, other anions can be used, such as methylsulfate, ethylsulfate, hydroxide, acetate, formate, citrate, sulfate, carbonate, and the like. Chloride and methylsulfate are preferred herein as anion A⁻.

The amount of fabric softening agent (fabric softener) in liquid compositions of this invention is typically from 2% to 50%, preferably from 4% to 30%, by weight of the composition. The lower limits are amounts needed to contribute effective fabric softening performance when added to laundry rinse baths in the manner which is customary in home laundry practice. The higher limits are suitable for concentrated products which provide the consumer with more economical usage due to a reduction of packaging and distributing costs.

Heavy metal ion sequestrants

Heavy metal ion sequestrants are essential components herein for the purpose of the invention. By heavy metal ion sequestrants it is meant components which act to sequester (chelate) heavy metal ions. These components may also have calcium and magnesium chelation capacity, but preferentially they bind heavy metal ions such as iron, manganese and copper.

Heavy metal ion sequestrants are present at a level less than 0.5% (excluding 0.5%), preferably in amount from 0.001% (10ppm) to 0.5%, more preferably from 0.005% to 0.1%, most preferably from 0.01% to 0.05% by weight of the compositions.

Heavy metal ion sequestrants, which are acidic in nature, having for example phosphonic acid or carboxylic acid

functionalities, may be present either in their acid form or as a complex/salt with a suitable counter cation such as an alkali or alkaline metal ion, ammonium, or substituted ammonium ion, or any mixtures thereof. Preferably any salts/complexes are water soluble. The molar ratio of said counter cation to the heavy metal ion sequestrant is preferably at least 1:1.

Suitable heavy metal ion sequestrants for use herein include the amino carboxylic acids such as ethylenediamine-N,N'-disuccinic acid (EDDS), ethylenediamine tetraacetic acid (EDTA), N-hydroxyethylenediamine triacetic acid, nitrilotriacetic acid (NTA), ethylene diamine tetrapropionic acid, ethylenediamine-N,N'-diglutamic acid, 2-hydroxypropylenediamine-N,N'-disuccinic acid, triethylenetetraamine hexacetic acid, diethylenetriamine pentaacetic acid (DETPA), trans 1,2 diaminocyclohexane-N,N,N',N'-tetraacetic acid or ethanoldiglycine.

Other suitable heavy metal ion sequestrants for use herein include the organo aminophosphonic acids such as ethylenediamine tetrakis (methylenephosphonic acid), diethylene triamine-N,N,N',N''-pentakis (methylene phosphonic acid) (DETMP), 1-hydroxyethane 1,1-diphosphonic acid (HEDP) or hydroxyethane dimethylenephosphonic acid.

Although not preferred for use herein, other suitable heavy metal ion sequestrants are gluconic acid, citric acid, tartaric acid, isopropyl citric acid, oxydisuccinic acid, dipicolinic acid, 4,5 dihydroxy-m-benzenesulfonic acid, 8-hydroxyquinoline, sodium dithiocarbamate, sodium tetraphenylboron or ammonium nitrosophenyl hydroxylamine.

Mixture of any of the herein before described heavy metal ion sequestrants can also be used.

Especially preferred is ethylenediamine-N,N'-disuccinic acid (EDDS), most preferably present in the form of its S,S isomer, which is preferred for its biodegradability profile.

The heavy metal ion sequestrants can be added to the composition at any point during the processing including into the water seat, after the addition of electrolyte (hot) or post-addition to the cooled product or mixed with any other raw material prior to the addition into the final mix. Preferably, the heavy metal ion sequestrants are incorporated into the water seat premix with minors before the softener active injection.

In the fabric softener composition of the invention, there is also a sensitive component selected from a perfume, a dye, a fatty acid compound of Iodine Value (IV) of at least 2, a compound having one or more fatty acid moieties of IV of at least 2, and mixtures thereof.

Perfume

As a compound in the present invention the word perfume encompasses individual perfume components and compositions of perfume components. Selection of any perfume is based solely on aesthetic considerations.

Perfume, in the sense of perfume components or compositions of perfume components, can be any odoriferous materials or any materials which act as a malodour counteractant. The perfume will most often be liquid at ambient temperatures, but also can be liquified solid such as the various camphoraceous perfumes known in the art. The perfume can be relatively simple in composition or can comprise highly sophisticated, compact mixtures of natural or synthetic chemical components, all chosen to provide any desired odour.

Useful perfumes are those odorous materials that deposit on fabrics during the laundry process and are detectable by people with normal olfactory sensity. Many of the perfume ingredients along with their odor corrector and their physical and chemical properties are given in "Perfume and Flavor chemicals (aroma chemicals)", Stephen Arctender, Vols. I and II, Aurthor, Montclair, H.J. and the Merck Index, 8th Edition, Merck & Co., Inc. Rahway, N.J. Perfume components and compositions can also be found in the art, e.g. US Patent Nos. 4,145,184, 4,152,272, 4,209,417 or 4,515,705.

A wide variety of chemicals are known for perfume use including materials such as aldehydes, ketones, esters and the like. More commonly, naturally occurring plant and animal oils and exudates comprising complex mixtures of various chemical components are known for use as perfume, and such materials can be used herein. Typical perfumes can comprise e.g. woody/earthy bases containing exotic materials such as sandalwood oil, civet and patchouli oil. The perfume also can be of a light floral fragrance e.g. rose or violet extract. Further the perfume can be formulated to provide desirable fruity odours e.g. lime, lemon or orange.

Particular examples of useful perfume components and compositions are anetole, benzaldehyde, benzyl acetate, benzyl alcohol, benzyl formate, iso-bornyl acetate, camphene, cis-citral (neral), citronellal, citronellol, citronellyl acetate, paracymene, decanal, dihydrolinalool, dihydromyrcenol, dimethyl phenyl carbinol, eucalyptol, geranial, geraniol, geranyl acetate, geranyl nitrile, cis-3-hexenyl acetate, hydroxycitronellal, d-limonene, linalool, linalool oxide, linalyl acetate, linalyl propionate, methyl anthranilate, alpha-methyl ionone, methyl nonyl acetaldehyde, methyl phenyl carbiny acetate, laevo-menthyl acetate, menthone, iso-menthone, myrcene, myrcenyl acetate, myrcenol, nerol, neryl acetate, nonyl acetate, phenyl ethyl alcohol, alpha-pinene, beta-pinene, gamma-terpinene, alpha-terpineol, beta-terpineol, terpinyl acetate, vertenex (para-tertiary-butyl cyclohexyl acetate), amyl cinnamic aldehyde, iso-amyl salicylate, beta-caryophyllene, cedrene, cinnamic alcohol, couramin, dimethyl benzyl carbiny acetate, ethyl vanillin, eugenol, iso-eugenol, flor acetate, heliotrophine, 3-cis-hexenyl salicylate, hexyl salicylate, lilial (para-tertiarybutyl-alpha-methyl hydrocinnamic aldehyde), gamma-methyl ionone, nerolidol, patchouli alcohol, phenyl hexanol, beta-selinene, trichloromethyl phenyl carbiny acetate, triethyl citrate, vanillin, veratraldehyde, alpha-cedrene, beta-cedrene, C15H24sesquiterpenes, benzophenone, benzyl salicylate, ethylene brassylate, galaxolide (1,3,4,6,7,8-hexahydro-4,6,6,7,8,8,-hexamethyl-cyclo-penta-gamma-

2-benzopyran), hexyl cinnamic aldehyde, lylal (4-(4-hydroxy-4-methyl pentyl)-3-cyclohexene-10-carboxaldehyde), methyl cedrylone, methyl dihydro jasmonate, methyl-beta-naphthyl ketone, musk ambrette, musk idanone, musk ketone, musk tibetine, musk xylol, aurantiol and phenylethyl phenyl acetate.

The perfume compound is included in the fabric softener compositions of the invention in a weight ratio of perfume to fabric softener of 1:100 to 1:2, preferably from 1:70 to 1:3, most preferably from 1:40 to 1:4. The higher ratios relate to diluted compositions while the lower ratios relate to concentrated compositions. The most appropriate ratio of perfume to fabric softener will easily be identified by knowing the dilution and the desired final amount in the fabric treatment composition.

Dye

As a compound in the present invention the dye(s) includes water soluble dye systems, conventional dyes and mixtures thereof. The dye will be present in amount of from 0.2 to 200ppm, preferably from 1 to 100ppm and most preferably from 2 to 60ppm by weight of the composition.

Suitable water soluble dye systems include those which comprise a dye selected from:

1. Quinoline Yellow 70 with color index no. 47005;
2. Tartrazine XX90 with color index no. 19140;
3. Orange RGL90 with color index no. 15985;
4. Ponceau 4RC82 with color index no. 16255;
5. Blue AE85 with color index no. 42090;
6. Patent Blue V85/V50 with color index no. 42051; and
7. mixtures thereof.

Still other suitable dyes are the conventional dyes selected from Acid Red 52 with color index no. 45100, Acid Yellow 3 with color index no. 47005, Acid Blue 127 with color index no. 61135, Acid Blue 5 with color index no. 42051, Acid Blue 80 with color index no. 61585 and mixtures thereof.

The dyes can be added to the composition at any point during the processing including into the water seat, after the addition of optional electrolyte (hot) or post-addition to the cooled product or mixed with any other raw material during the process or mixed with any other raw material prior to the addition into the final mix.

Fatty acid compound of Iodine Value (IV) of at least 2 and/or compound having one or more fatty acid moieties of Iodine value (IV) of at least 2

When said fatty acid compound of Iodine Value (IV) of at least 2 and/or said compound having one or more fatty acid moieties of Iodine value (IV) of at least 2 are present, the present invention has been seen beneficial to the storage stability of said compounds.

Most of fatty acid compounds of IV of at least 2 and/or compounds having one or more fatty acid moieties of IV of at least 2 are fabric softener compounds.

Accordingly, in the present invention, said fatty acid compound of IV of at least 2 and/or said compound having one or more fatty acid moieties of IV of at least 2 can be the only fabric softener actives, or said fatty acid compound of IV of at least 2 and/or said compound having one or more fatty acid moieties of IV of at least 2 can be a softener in addition to the fabric softener disclosed herein before.

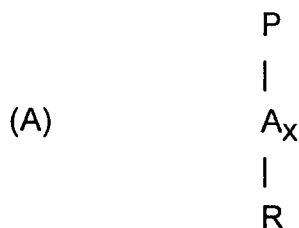
Such compounds having one or more fatty acid moieties of IV of at least 2 include the herein before described compounds in the quaternary ammonium compounds disclosure such as N,N-di(tallowyl-oxy-ethyl)-N,N-dimethyl ammonium chloride; N,N-di(tallowyl-oxy-ethyl)-N-methyl, N-(2-hydroxyethyl); N,N-di(2-tallowyl-oxy-2-oxo-ethyl)-N,N-dimethyl ammonium chloride; N,N-di(2-tallowyl-oxyethylcarbonyloxyethyl)-N,N-dimethylammonium chloride; N-(2-tallowyl-oxy-2-ethyl)-N-(2-tallowyloxy-2-oxo-ethyl)-N,N-dimethyl ammonium chloride; N,N,N-tri(tallowyl-oxy-ethyl)-N-methyl ammonium chloride; N-(2-tallowyl-oxy-2-oxoethyl)-N-(tallowyl-N,N-dimethyl-ammonium chloride; 1,2-ditallowyl-oxy-3-trimethylammonio propane chloride; and mixtures of any of the above materials, wherein said tallow moiety has a IV value of at least 2.

Optional ingredients

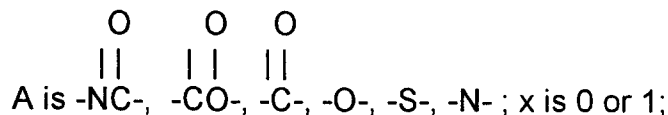
Fully formulated fabric softening compositions can contain polymers having a partial or net cationic charge.

Such polymers can be used at levels of from 0.001% to 10%, preferably 0.01% to 2% by weight of the compositions.

Such polymers having a partial cationic charge can be polyamine N-oxide containing polymers which contain units having the following structure formula (A):

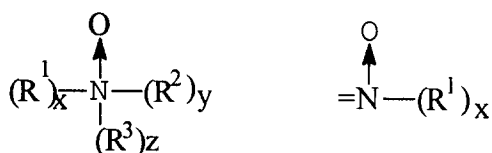


wherein P is a polymerisable unit, whereto the R-N→O group can be attached to or wherein the R-N→O group forms part of the polymerisable unit or a combination of both.



R are aliphatic, ethoxylated aliphatics, aromatic, heterocyclic or alicyclic groups or any combination thereof whereto the nitrogen of the N→O group can be attached or wherein the nitrogen of the N→O group is part of these groups.

The N→O group can be represented by the following general structures :



wherein R¹, R², and R³ are aliphatic groups, aromatic, heterocyclic or alicyclic groups or combinations thereof, x or/and y or/and z is 0 or 1 and wherein the nitrogen of the N→O group can be attached or wherein the nitrogen of the N→O group forms part of these groups.

The N→O group can be part of the polymerisable unit (P) or can be attached to the polymeric backbone or a combination of both.

Suitable polyamine N-oxides wherein the N→O group forms part of the polymerisable unit comprise polyamine N-oxides wherein R is selected from aliphatic, aromatic, alicyclic or heterocyclic groups.

One class of said polyamine N-oxides comprises the group of polyamine N-oxides wherein the nitrogen of the N→O group forms part of the R-group. Preferred polyamine N-oxides are those wherein R is a heterocyclic group such as pyridine, pyrrole, imidazole, pyrrolidine, piperidine, quinoline, acridine and derivatives thereof.

Another class of said polyamine N-oxides comprises the group of polyamine N-oxides wherein the nitrogen of the N→O group is attached to the R-group.

Other suitable polyamine N-oxides are the polyamine oxides whereto the N→O group is attached to the polymerisable unit.

Preferred class of these polyamine N-oxides are the polyamine N-oxides having the general formula (A) wherein R is an aromatic, heterocyclic or alicyclic groups wherein the nitrogen of the N→O functional group is part of said R group.

Examples of these classes are polyamine oxides wherein R is a heterocyclic compound such as pyridine, pyrrole, imidazole and derivatives thereof.

Another preferred class of polyamine N-oxides are the polyamine oxides having the general formula (A) wherein R are aromatic, heterocyclic or alicyclic groups wherein the nitrogen of the N→O functional group is attached to said R groups. Examples of these classes are polyamine oxides wherein R groups can be aromatic such as phenyl.

Any polymer backbone can be used as long as the amine oxide polymer formed is water-soluble and has dye transfer inhibiting properties. Examples of suitable polymeric backbones are polyvinyls, polyalkylenes, polyesters, polyethers, polyamide, polyimides, polyacrylates and mixtures thereof.

The amine N-oxide polymers useful herein typically have a ratio of amine to the amine N-oxide of 10:1 to 1:1000000. However the amount of amine oxide groups present in the polyamine N-oxide containing polymer can be varied by appropriate copolymerization or by appropriate degree of N-oxidation. Preferably, the ratio of amine to amine N-oxide is from 2:3 to 1:1000000. More preferably from 1:4 to 1:1000000, most preferably from 1:7 to 1:1000000. The polymers of the present invention actually encompass random or block copolymers where one monomer type is an

amine N-oxide and the other monomer type is either an amine N-oxide or not. The amine oxide unit of the polyamine N-oxides has a $\text{PKa} < 10$, preferably $\text{PKa} < 7$, more preferred $\text{PKa} < 6$.

The polyamine N-oxide containing polymer can be obtained in almost any degree of polymerisation. The degree of polymerisation is not critical provided the material has the desired water-solubility and dye-suspending power.

Typically, the average molecular weight of the polyamine N-oxide containing polymer is within the range of 500 to 1000,000; preferably from 1,000 to 50,000, more preferably from 2,000 to 30,000, most preferably from 3,000 to 20,000.

Such polymers having a net cationic charge include polyvinylpyrrolidone (PVP) as well as copolymers of N-vinylimidazole N-vinyl pyrrolidone, having an average molecular weight range in the range 5,000 to 100,000, preferably 5,000 to 50,000; said copolymers having a molar ratio of N-vinylimidazole to N-vinylpyrrolidone from 1 to 0.2, preferably from 0.8 to 0.3.

Surfactant/Concentration Aids

Concentrated compositions of the present invention may require organic and/or inorganic concentration aids to go to even higher concentrations and/or to meet higher stability standards depending on the other ingredients. Surfactant concentration aids are typically selected from single long chain alkyl cationic surfactants, nonionic surfactants, amine oxides, fatty acids, and mixtures thereof, typically used at a level of from 0 to 15% of the composition.

Single long chain alkyl cationic surfactants

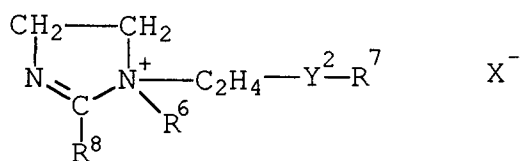
Such mono-long-chain-alkyl cationic surfactants useful in the present invention are, preferably, quaternary ammonium salts of the general formula :



wherein the R^2 group is C_{10} - C_{22} hydrocarbon group, preferably C_{12} - C_{18} alkyl group of the corresponding ester linkage interrupted group with a short alkylene (C_1 - C_4) group between the ester linkage and the N, and having a similar hydrocarbon group, e.g., a fatty acid ester of choline, preferably C_{12} - C_{14} (coco) choline ester and/or C_{16} - C_{18} tallow choline ester at from 0.1% to 20% by weight of the softener active. Each R is a C_1 - C_4 alkyl or substituted (e.g., hydroxy) alkyl, or hydrogen, preferably methyl, and the counterion X^- is a softener compatible anion, for example, chloride, bromide, methyl sulfate, etc.

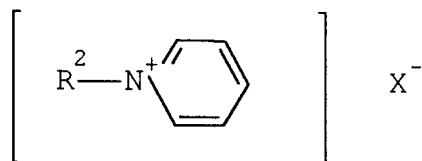
Other cationic materials with ring structures such as alkyl imidazoline, imidazolinium, pyridine, and pyridinium salts having a single C_{12} - C_{30} alkyl chain can also be used. Very low pH is required to stabilize, e.g., imidazoline ring structures.

Some alkyl imidazolinium salts and their imidazoline precursors useful in the present invention have the general formula :



wherein Y^2 is $-\text{C}(\text{O})-\text{O}-$, $-\text{O}(\text{O})\text{C}-$, $-\text{C}(\text{O})-\text{N}(\text{R}^5)-$, or $-\text{N}(\text{R}^5)-\text{C}(\text{O})-$ in which R^5 is hydrogen or a C_1 - C_4 alkyl radical; R^6 is a C_1 - C_4 alkyl radical or H (for imidazoline precursors); R^7 and R^8 are each independently selected from R and R^2 as defined hereinbefore for the single-long-chain cationic surfactant with only one being R^2 .

Some alkyl pyridinium salts useful in the present invention have the general formula :

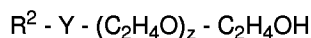


wherein R^2 and X^- are as defined above. A typical material of this type is cetyl pyridinium chloride.

Nonionic Surfactant (Alkoxylated Materials)

Suitable nonionic surfactants for use herein include addition products of ethylene oxide and, optionally, propylene oxide, with fatty alcohols, fatty acids, fatty amines, etc.

5 Suitable compounds are substantially water-soluble surfactants of the general formula :



10 wherein R^2 is selected from primary, secondary and branched chain alkyl and/or acyl hydrocarbyl groups; primary, secondary and branched chain alkenyl hydrocarbyl groups; and primary, secondary and branched chain alkyl- and alkenyl-substituted phenolic hydrocarbyl groups; said hydrocarbyl groups having a hydrocarbyl chain length of from 8 to 20, preferably from 10 to 18 carbon atoms.

Y is typically -O-, -C(O)O-, -C(O)N(R)-, or -C(O)N(R)R-, in which R^2 and R, when present, have the meanings given hereinbefore, and/or R can be hydrogen, and z is at least 8, preferably at least 10-11.

15 The nonionic surfactants herein are characterized by an HLB (hydrophilic-lipophilic balance) of from 7 to 20, preferably from 8 to 15.

Examples of particularly suitable nonionic surfactants include

Straight-Chain, Primary Alcohol Alkoxylates such as tallow alcohol-EO(11), tallow alcohol-EO(18), and tallow alcohol-EO(25);

20 Straight-Chain, Secondary Alcohol Alkoxylates such as 2-C₁₆EO(11); 2-C₂₀EO(11); and 2-C₁₆EO(14);

Alkyl Phenol Alkoxylates, such as p-tridecylphenol EO(11) and p-pentadecylphenol EO(18), as well as

Olefinic Alkoxylates, and Branched Chain Alkoxylates such as branched chain primary and secondary alcohols which are available from the well-known "OXO" process.

25 Amine Oxides

Suitable amine oxides include those with one alkyl or hydroxyalkyl moiety of 8 to 28 carbon atoms, preferably from 8 to 16 carbon atoms, and two alkyl moieties selected from alkyl groups and hydroxyalkyl groups with 1 to 3 carbon atoms.

30 Examples include dimethyloctylamine oxide, diethyldodecylamine oxide, bis-(2-hydroxyethyl)dodecylamine oxide, dimethyldodecyl-amine oxide, dipropyldodecylamine oxide, methylethylhexadecylamine oxide, dimethyl-2-hydroxy-octadecylamine oxide, and coconut fatty alkyl dimethylamine oxide.

Fatty Acids

35

Suitable fatty acids include those containing from 12 to 25, preferably from 16 to 20 total carbon atoms, with the fatty moiety containing from 10 to 22, preferably from 15 to 17 (mid cut), carbon atoms.

Electrolyte Concentration Aids

40

Inorganic viscosity control agents which can also act like or augment the effect of the surfactant concentration aids, include water-soluble, ionizable salts which can also optionally be incorporated into the compositions of the present invention. A wide variety of ionizable salts can be used. Examples of suitable salts are the halides of the Group IA and IIA metals of the Periodic Table of the Elements, e.g., calcium chloride, magnesium chloride, sodium chloride, potassium bromide, and lithium chloride. The ionizable salts are particularly useful during the process of mixing the ingredients to make the compositions herein, and later to obtain the desired viscosity. The amount of ionizable salts used depends on the amount of active ingredients used in the compositions and can be adjusted according to the desires of the formulator. Typical levels of salts used to control the composition viscosity are from 20 to 15,000 parts per million (ppm), preferably from 50 to 10,000 ppm, by weight of the composition.

50 Alkylene polyammonium salts can be incorporated into the composition to give viscosity control in addition to or in place of the water-soluble, ionizable salts above. In addition, these agents can act as scavengers, forming ion pairs with anionic detergent carried over from the main wash, in the rinse, and on the fabrics, and may improve softness performance. These agents may stabilize the viscosity over a broader range of temperature, especially at low temperatures, compared to the inorganic electrolytes.

55 Specific examples of alkylene polyammonium salts include L-lysine monohydrochloride and 1,5-diammonium 2-methyl pentane dihydrochloride.

Another optional, but preferred, ingredient is a liquid carrier. Suitable liquid carriers for the present invention are selected from water, organic solvents and mixtures thereof. Preferably the liquid carrier employed in the instant compositions is at least primarily water due to its low cost, safety, and environmental compatibility. The level of water in the

liquid carrier is preferably at least 10%, most preferably at least 50%, by weight of the carrier. Mixtures of water and low molecular weight, e.g., <200, organic solvent, e.g., lower alcohols such as ethanol, propanol, isopropanol or butanol are useful as the carrier liquid. Low molecular weight alcohols include monohydric, dihydric (glycol, etc.) trihydric (glycerol, etc.), and higher polyhydric (polyols) alcohols.

Still other optional ingredients are stabilizers, such as well known antioxidants and reductive agents, dye transfer inhibiting agents, Soil Release Polymers, thickeners, emulsifiers, bacteriocides, colorants, preservatives, optical brighteners, dye fixative agents, anti ionisation agents, antifoam agents, builders and enzymes excluding cellulase.

Form of the composition

The composition of the present invention may be provided in any suitable forms for use in the rinse cycle of a laundry washing process or as a pre-treatment product or in a spray product. Suitable forms of the compositions include the liquid compositions such as aqueous or non-aqueous compositions, or solid compositions such as solid particulate fabric softener compositions or solid compositions in dryer-added sheet products.

The invention is illustrated in the following non limiting examples, in which all percentages are on a weight basis unless otherwise stated.

Example 1

The following liquid fabric softening compositions A to C were prepared, where Composition A is a prior art composition and B and C are in accord with the invention:

	A	B	C
DEQA (1)	20.0	20.0	20.0
Hydrochloride acid	0.02	0.02	0.02
EDDS (2)	-	100 ppm	-
DETMP (3)	-	-	200ppm
SRP	0.1	0.1	0.1
Polyethylene Glycol	1.0	1.0	1.0
4000			
Perfume	1.0	1.0	1.0
Electrolyte (4)	0.2	0.2	0.2
Silicone antifoam	0.01	0.01	0.01
Dye	0.005	0.005	0.005
Water	up to 100	up to 100	up to 100

(1) Di-(tallowyloxyethyl) dimethyl ammonium chloride

(2) Ethylenediamine-N,N'-disuccinic acid

(3) Diethylenetriamine-N,N,N',N'',N''-pentakis(methylene phosphonic acid)

(4) Calcium chloride

(5) Acid Blue 127 of Color Index 61135

The herein before described compositions were made according to known process for preparing fabric softener compositions by injecting into the hot water seat (60-70°C) containing minors the molten DEQA, followed by slowly adding the electrolyte to the desired viscosity and thereafter the perfume before leaving the product to cool. Where present, i.e. compositions B and C, the heavy metal ion sequestrant was added to the waterseat prior to the fabric softener compound injection.

Storage stability results

Compositions A to C were then assessed for their storage stability with regard to the dye and/or perfume stability.

Dye stability test

The dye stability was assessed by the determination of the Delta-E values measured by a Spectraflash (Data color int.) and defined for example in ASTM D2244. The lower the value, the better the dye stability.

Perfume intensity assessment

The intensity of the perfume has been evaluated by trained perfumers and allocated an intensity rating varying between 1 (no odour detected) and 10 (perfection). The higher the rating, the stronger the odour. Grades below 5 indicate to varying degrees, an odor unlike that intended for the product. In this instance, a trained perfumer is defined as a person having at least 6 months training with demonstrated evidence of olfactive sensitivity.

Intensity rating	Odour in product
10	Odour essentially all perfume
7	Odour mostly perfume
5	Odor of perfume and base approximately equal
3	Odour essentially unlike that intended for product
1	Odour more unlike that intended for product

The results are as follows:

	A	B	C
Dye stability Delta-E(*) 2 months 35°C	2.16	0.39	0.33
Perfume intensity (as is)(**) 3 months at 35°C	6	7	7

(*) Delta-E has been calculated versus 2 months old samples kept at room temperature.

(**) Perfume intensity was assessed on the neat product versus a freshly made product of composition A

It can be seen that the presence of a heavy metal ion sequestrant increase the storage stability of the product containing dyes and perfumes.

Example 2

The following formulations according to the invention were prepared:

	D	E	F
DEQA	10	10	10
Hydrochloride acid	0.02	0.02	0.02
Dye	50ppm	50ppm	50ppm
Electrolyte	250ppm	250ppm	250ppm
Perfume	2.0	2.0	2.0
EDDS	-	250ppm	500ppm
Water	up to 100	up to 100	up to 100
Dye stability Delta-E(*) 1 month 22°C-24°C	5.6	2.5	2.3
Dye stability Delta-E(**) 1 month at 35°C	13.4	4.9	4.0
Perfume intensity (as is)(***) 1 month at 35°C	6	7	7

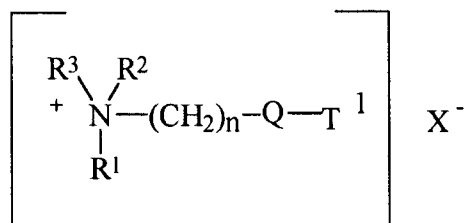
(*) Delta-E has been calculated versus freshly made product.

(**) Delta-E has been calculated versus freshly made product.

(***) Perfume intensity was assessed versus a freshly made product of composition A

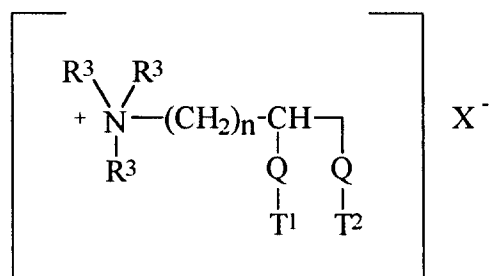
Claims

1. A fabric softener composition which is free of cellulase and which comprises:
 - i) from 1% to 80% by weight of a fabric softener compound,
 - ii) from 10ppm to 0.5% by weight of a heavy metal ion sequestrant, and said composition comprises a component selected from a dye, a perfume, a fatty acid compound of Iodine Value (IV) of at least 2, a compound having one or more fatty acid moieties of Iodine value (IV) of at least 2, and mixtures thereof.
2. A composition according to Claim 1, wherein said heavy metal ion sequestrant is selected from amino carboxylic acid, organo aminophosphonic acid compounds, and mixture thereof.
3. A composition according to Claim 2, wherein said heavy metal ion sequestrant is an amino carboxylic acid compound selected from ethylenediamine-N,N'-disuccinic acid (EDDS), ethylenediamine tetraacetic acid (EDTA), N-hydroxyethylenediamine triacetic acid, nitrilotriacetic acid, ethylene diamine tetrapropionic acid, ethylenediamine-N,N'-diglutamic acid, 2-hydroxypropylenediamine-N,N'-disuccinic acid, triethylenetetraamine hexacetic acid, diethylenetriamine pentaacetic acid, trans 1,2 diaminocyclohexane-N,N,N',N'-tetraacetic acid and ethanoldiglycine, preferably ethylenediamine-N,N'-disuccinic acid.
4. A composition according to any one of Claims 1-3, wherein said fabric softener is a cationic biodegradable fabric softener compound.
5. A composition according to any one of Claims 1-4, wherein said fabric softener is selected from biodegradable quaternary ammonium compounds of formula:



(I)

or



(II)

Q is selected from -O-C(O)-, -C(O)-O-, -O-C(O)-O-, -NR⁴-C(O)-, -C(O)-NR⁴-;

R¹ is (CH₂)_n-Q-T² or T³;

R² is (CH₂)_m-Q-T⁴ or T⁵ or R³;

R³ is C₁-C₄ alkyl or C₁-C₄ hydroxyalkyl or H;

R⁴ is H or C₁-C₄ alkyl or C₁-C₄ hydroxyalkyl;

T¹, T², T³, T⁴, T⁵ are independently C₁₁-C₂₂ alkyl or alkenyl;

n and m are integers from 1 to 4; and

X⁻ is a softener-compatible anion.

6. A composition according to any one of Claims 1-5, wherein said perfume is present in a weight ratio of perfume to fabric softener of from 1:100 to 1:2.
7. A composition according to any one of Claims 1-6, wherein said dye is in amount of from 0.2 to 200ppm by weight of the composition.



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 87 0115

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	WO-A-94 20597 (PROCTER & GAMBLE) * page 22; claims 3,4 * ---	1-4	C11D3/00 C11D3/36
E	US-A-5 474 690 (WAHL ERROL H ET AL) * column 13, line 21-26 * * column 13, line 49-53 * * column 14, line 23-46 * * claims * ---	1-5	
Y	EP-A-0 534 009 (PROCTER & GAMBLE) * the whole document * ---	1	
Y	EP-A-0 052 517 (PROCTER & GAMBLE) * abstract * * page 19, line 30 * ---	1	
A	EP-A-0 006 268 (PROCTER & GAMBLE) * the whole document * -----	1-7	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			C11D
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 11 March 1996	Examiner Pelli Wablat, B
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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