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(54) Fabric softening composition.

(57) A fabric softening composition comprises a water-insuble cationic fabric softener, a water-soluble cationic or nonionic surfactant and a hydrophobic adjunct which is either a non-cyclic hydrocarbon or a fatty acid ester of a monohydric alcohol. The composition is in the form of a dispersion of anisotropic softener phase in an isotropic aqueous surfactant solution phase. The composition has improved softening effectiveness combined with good phase stability and low viscosity.

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FABRIC SOFTENING COMPOSITION

This invention relates to fabric softening compositions and, in particular, to compositions in aqueous medium having improved softening effectiveness combined with excellent physical characteristics, especially formulation stability.

Conventional rinse-added fabric softening compositions contain fabric softening agents which are substantially water-insoluble cationic materials usually having two long alkyl chains. Typical of such materials are di-stearyl di-methyl ammonium chloride and imidazolinium compounds substituted with two stearyl groups. These materials are normally prepared in the form of an aqueous dispersion or emulsion, and it is generally not possible to prepare such aqueous dispersions with more than about 6% of cationic material without taking special precautions to ensure acceptable viscosity and stability characteristics. Indeed, with cationic levels in excess of about 8% the problems of physical instability and high viscosity become, in the case of conventional fabric softening products, almost intractable. This, of course, limits the level of softening performance achievable with conventional compositions without using excessive amounts of product, and also adds substantially to distribution and packaging costs, because of the need to market such dilute solutions of the active ingredient.

One approach which has been taken to improve the softening performance of cationic fabric softeners has been via the incorporation of certain fatty or oily materials in the softener active system. While these adjunct materials have little intrinsic softening capability in their own right, they are apparently effective in extending the performance of conventional cationic softening materials, both in concentrated and normal softener compositions so that the cost-effectiveness of these compositions is considerably improved. Moreover, by incorporating relatively high proportions of the oily adjunct materials in relation to the cationic softener, and by adding thereto relatively high proportions of a water-soluble cationic surfactant in relation to the cationic softener, concentrated softening compositions can be prepared containing a high total level of active softening materials. Reference is made to European Patent Application No. 78200059 and Belgian Patent No. 868,934, both of which are relevant to this general approach.

Formulations prepared in this manner, however, are still not entirely satisfactory. Thus, while such compositions do allow a high concentration of active ingredient, the level of softness benefit delivered by such compositions on a unit active weight basis is still much lower than for conventional dilute products and problems of physical formulation characteristics, especially phase stability and also viscosity, still remain. Indeed, phase stability remains a problem even in the case of dilute softener compositions formulated in the manner of the above prior art references.

Other approaches have also been taken for improving the physical characteristics of softener compositions of course. Thus, it is generally known (for example in U.S. Patent No. 3,681,241) that the presence of ionizable salts in concentrated compositions do help reduce viscosity, but these materials do not offer the additional benefit of enhancing the softening performance of the compositions. More importantly, the quantity of ionizable salts required for significant viscosity reduction is found to be generally deleterious in terms of product stability. Dutch patent application no. 6706178 relates to viscosity control in fabric softening compositions with up to 12% of cationic softener, and suggests the use of low molecular weight hydrocarbons for this purpose, while German patent application no. 25 03 026 discloses a complex softener/disinfectant composition in which a long chain fatty alcohol is suggested as a solubilization aid. Finally, U.S. Patent No. 3,793,196 describes an improved viscosity softening agent in the form of an oil-in-water emulsion comprising a cationic surface-active agent, a higher fatty alcohol, a sorbitan fatty acid ester and a polyethoxylated nonionic surfactant.

The present invention accordingly provides a fabric softening composition having improved softening characteristics and cost-effectiveness combined with excellent physical characteristics, especially phase stability, freeze-thaw behaviour and low viscosity; and it further provides a concentrated fabric softening composition having satisfactory characteristics for consumer use, based on cationic fabric softener as the major active component.

According to the present invention, there is provided an aqueous fabric softening composition characterized by:-

(a) from 2% to 22% by weight of a water-insoluble cationic fabric softener,

(b) from 0.05% to 8% by weight of a water-soluble cationic or nonionic surfactant or mixture thereof, and

(c) from 0.25% to 15% by weight of a C_{10}-C_{40} non-cyclic hydrocarbon, or of a fatty acid ester of a monohydric alcohol, said ester having a total of 10 to 40 carbon atoms, or of a mixture thereof,

wherein the weight ratio of (a) to (b) is in the range from 100:1 to 5:2, and the weight ratio of (a) to (c) is in the range from 20:1 to 5:4.

The physical form of the composition is that of a dispersion of an anisotropic softener phase in an aqueous isotropic surfactant solution phase. The physical form is simply determined under a polarizing microscope. The anisotropic/isotropic phase system is highly important for achieving optimum viscosity, stability, softening and other textile benefits.

The water insoluble cationic fabric softener is preferably a di-C_{12}-C_{24} alkyl or alkenyl 'onium salt, especially a mono- or polyammonium salt, an imidazolinium salt or a mixture of such salts. Highly preferred are mono-quaternary ammonium salts, imidazolinium salts and mixtures thereof.

The water-soluble cationic surfactant is preferably a mono-C_{8-24} alkyl or alkenyl 'onium salt, especially a mono- or polyammonium salt, an imidazolinium salt, a pyridinium salt or a mixture of such salts. Highly preferred are mono-quaternary ammonium salts, imidazolinium salts and mixtures thereof.

The preferred water-soluble nonionic surfactant has the general formula $RO(CH_2CH_2O)_nH$ wherein R is a C_{8-20} alkyl or alkenyl group, and n is from 2 to about 100.

From the point of view of optimum product stability and viscosity and softening performance, the weight ratio of water-insoluble cationic to water-soluble cationic and/or nonionic surfactant, falls preferably in the range from about 20:1 to about 4:1, especially from about 15:1 to about 6:1. The weight ratio of the cationic softener to the hydrophobic adjunct, on the other hand, preferably falls in the range from about 8:1 to about 2:1. In terms of level, compositions of the invention preferably comprise from about 0.1% to about 6% of the water-soluble cationic and/or nonionic surfactant, from about 0.5% to about 6% of the non-cyclic hydrocarbon and from 0% to about 6% of the fatty acid ester.

In the present specification, percentage figures given for components in a composition refer to the weight percent of that component in the composition.

With regard to the hydrophobic adjunct, highly preferred materials are C_{12}-C_{24}, especially C_{12}-C_{20} paraffins or paraffin mixtures, esters of C_{12}-C_{24} fatty acids with monohydric alcohols having from 1 to 8 carbon atoms, and mixtures of these paraffin and fatty acid ester materials in a 3:1 to 1:3 weight ratio.

At lower concentrations of water-insoluble cationic softener, less than about 6% by weight, it is preferred to include relatively low levels of water-soluble surfactant in relation to the insoluble softener for achieving optimum stability and viscosity, while at higher concentrations of water insoluble cationic softener, greater than about 12% by weight, it is desirable to include relatively high levels of water-soluble surfactant in relation to the insoluble softener, Thus, there are three highly preferred executions:

(A) A composition comprising:-

(a) from 2% to 6% by weight of a water-insoluble di-C_{12}-C_{24} alkyl or alkenyl mono-quaternary ammonium salt,

(b) from 0.05 to 1% by weight of a water-soluble cationic surfactant which is:-

(i) a mono-C_8-C_{24} alkyl or alkenyl mono-quaternary salt,

(ii) a mono-C_8-C_{24} alkyl or alkenyl imidazolinium salt, or

(iii) a mixture thereof, and

(c) from 0.25% to 3 % by weight of a C_{12}-C_{24} paraffin or paraffin mixture,

wherein the weight ratio of (a) to (b) is in the range from 20:1 to 4:1 and the weight ratio of (a) to (c) is in the range from 5:1 to 2:1.

(B) A composition comprising:-

(a) from 6% to 12% by weight of a water-insoluble cationic fabric softener which is a mixture of:-

(i) a di-C_{12}-C_{24} alkyl or alkenyl mono-quaternary ammonium salt, and

(ii) a di-C_{12}-C_{24} alkyl or alkenyl imidazolinium salt,

wherein the weight ratio of (i) to (ii) is in the range from 1:6 to 1:1,

(b) from 0.5 to 6% by weight of a water-soluble cationic surfactant which is:-

(i) a mono-C_8-C_{24} alkyl or alkenyl mono-quaternary ammonium salt,

(ii) a mono-C_8-C_{24} alkyl or alkenyl imidazolinium salt, or

(iii) a mixture thereof, and

(c) from 1% to 6% by weight of a C_{12}-C_{24} preferably C_{12}-C_{20} paraffin or paraffin mixture,

wherein the weight ratio of (a) to (b) is in the range from 10:1 to 5:2, and the weight ratio of (a) to (c) is

in the range from 5:1 to 5:2; and

(C) A composition comprising

(a) from 12% to 22% of a water-insoluble di-C_{12}-C_{24} alkyl or alkenyl imidazolinium salt,

(b) from 2% to 8% of a water-soluble cationic surfactant which is:-

(i) a mono-C_8-C_{24} alkyl or alkenyl mono-quaternary ammonium salt,

(ii) a mono-C_8-C_{24} alkyl or alkenyl imidazolinium salt, or

(iii) a mixture thereof, and

(c) from 6% to 12% of a 3:1 to 1:3 mixture of:-

(i) a C_{12}-C_{24} preferably C_{12}-C_{20} paraffin or paraffin mixture, and

(ii) an ester of a C_{12}-C_{24} fatty acid with a C_1-C_8 monohydric alcohol.

wherein the weight ratio of (a) to (b) is in the range from 4:1 to 5:2, and the weight ratio of (a) to (c) is in the range from 7:2 to 5:4.

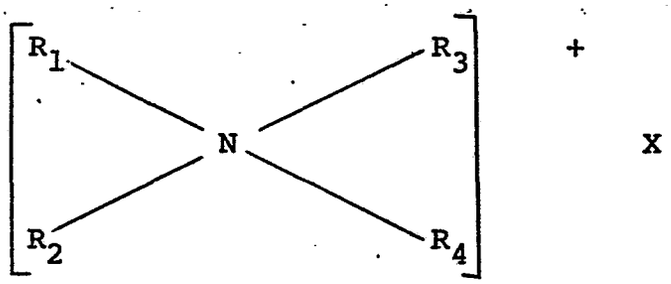
Compositions of the invention thus comprise three essential ingredients, a water-insoluble cationic fabric softener, a water-soluble cationic and/or nonionic surfactant and a hydrophobic adjunct selected from C_{10}-C_{40} non-cyclic hydrocarbons and fatty acid ester, the water soluble surfactant and the hydrophobic adjunct acting in combination to provide compositions of optimum viscosity and stability. The essential components will now be discussed in detail.

The Cationic Fabric Softener

The water-insoluble cationic fabric softener can be any fabric-substantive cationic sompound which, in pure form as a strong acid salt (e.g. chloride), has a solubility in distilled water at pH 2.5 and 20°C of less than 1g/l, or can be a mixture of such compounds. In this context, the soluble fraction of the surfactant is taken to be that material which cannot be separated from water by centrifugal action and which passes a 100nm Nuclepore

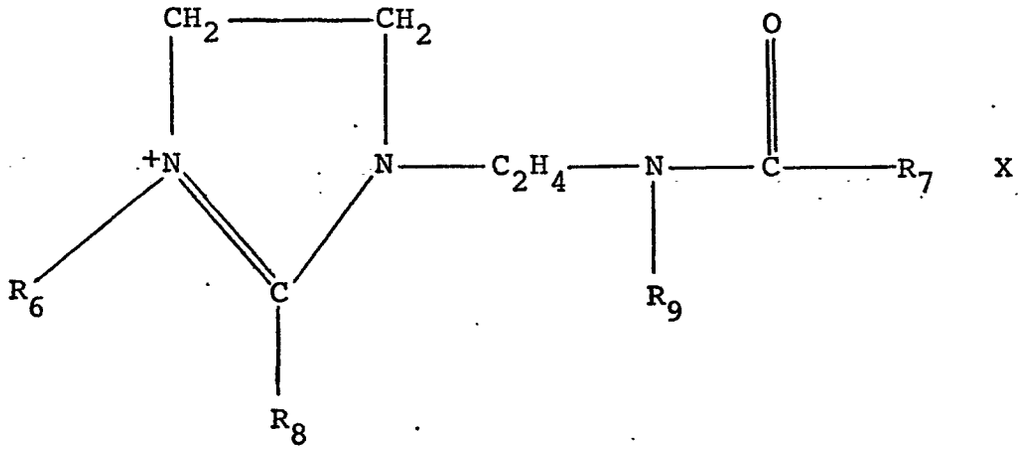
filter (Registered Trade Mark). Preferred materials are di-C_{12}-C_{24} alkyl or alkenyl 'onium salts, especially mono- and poly-ammonium salts, and imidazolinium salts. Optionally, the two long chain alkyl or alkenyl groups may be substituted or interrupted by functional groups such as -OH, -O-, CONH-, -COO-, etc.

Well known species of substantially water-insoluble mono-ammonium compounds are the quaternary ammonium compounds having the formula:-



wherein R_1 and R_2 represent alkyl or alkenyl groups of from about 12 to about 24 carbon atoms; R_3 and R_4 represent alkyl, alkenyl or hydroxyalkyl groups containing from 1 to about 4 carbon atoms; and X is the salt counter-anion, preferably selected from halide, methyl sulfate and ethyl sulfate radicals. Representative examples of these quaternary softeners include ditallow dimethyl ammonium chloride; ditallow dimethyl ammonium methyl sulfate; dihexadecyl dimethyl ammonium chloride; di (hydrogenated tallow alkyl) dimethyl ammonium chloride; dioctadecyl dimethyl ammonium chloride; dieicosyl dimethyl ammonium chloride; didocosyl dimethyl ammonium chloride; di(hydrogenated tallow) dimethyl ammonium methyl sulfate; dihexadecyl diethyl ammonium chloride; di(coconut alkyl) dimethyl ammonium chloride and di(coconut alkyl) dimethyl ammonium methosulfate. Of these ditallow dimethyl ammonium chloride and di (hydrogenated tallow alkyl) dimethyl ammonium chloride are preferred.

Another preferred class of water-insoluble cationic materials are the alkyl imidazolinium salts believed to have the formula:-



wherein R_6 is an alkyl containing from 1 to 4, preferably 1 or 2 carbon atoms, R_7 is an alkyl containing from 12 to 24 carbon atoms, R_8 is an alkyl containing from 12 to 24 carbon atoms, and R_9 is hydrogen or an alkyl containing from 1 to 4 carbon atoms and X is the salt counter-anion, preferably a halide, methosulfate or ethosulfate. Preferred imidazolinium salts include 3-methyl-1-(tallowylamido) ethyl -2-tallowyl-4,5-dihydroimidazolinium methosulfate and 3-methyl-1-(palmitoylamido)ethyl -2- octadecyl-4,5-dihydroimidazolinium chloride. Other useful imidazolinium materials are 2-heptadecyl-3-methyl-1-(2-stearylamido)-ethyl- 4,5-dihydroimidazolinium chloride and 2-lauryl-3-hydroxyethyl-1-(oleylamido)ethyl-4,5-dihydro imidazolinium chloride. Also suitable herein are the imidazolinium fabric softening components of U.S. Patent No. 4,127,489, incorporated herein by reference.

In the present invention, the water-insoluble cationic softener is present at a level of at least about 2%; below this level, the volume of product required to provide an acceptable level of softness benefit becomes excessively large. For softener levels in the range of about 2% to about 6%, there is, of course, generally no difficulty in preparing products of conventional type with the necessary low viscosity and good stability by adding, for instance, a low level of calcium chloride. For corresponding products based on mixed cationic/hydrocarbon or ester softeners, however, product stability and viscosity become a problem and the overall aim is to adjust the levels of the softening and surfactant components within the prescribed limits to provide products which are stable to separation in a centrifuge at 3000 r.p.m. for 16 hours and which have a viscosity of less than about 350 cp, preferably less than about 150 cp measured in a Brookfiel Viscometer, using Spindle No. 2 at 60 r.p.m. and at 21°C. The maximum level of cationic softener in the present formulations is determined by practical considerations; thus, above a cationic softener level of 22% the problems of physical stability and product viscosity are such that it is not generally possible to formulate stable pourable emulsions based on water-insoluble cationic softener as the major softening component.

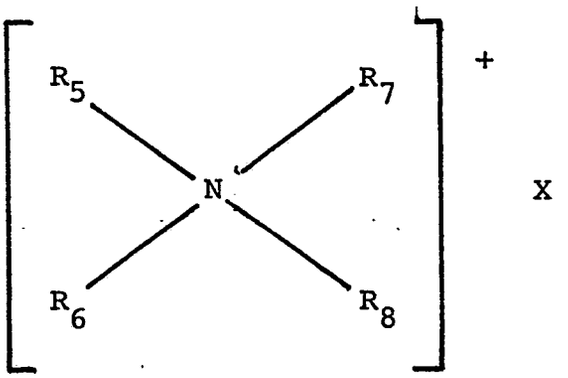
The Water-Soluble Surfactant

The water-soluble surfactant is a cationic or nonionic surfactant having a solubility in distilled water at pH 2.5 and 20°C of greater than 1g/l. Once again, the solubility of the cationic surfactant is defined with reference to the pure material in the form of a strong acid salt (e.g. chloride), and the soluble fraction of the

surfactant is taken to be that material which cannot be separated from water by centrifugal action and which passes a 100 nm Nuclepore filter.

Preferred water-soluble cationic surfactants are mono-C_8-C_{24} alkyl or alkenyl ammonium salts, imidazolinium salts, pyridinium salts and mixtures thereof.

Suitable water-soluble mono-ammonium compounds have the general formula:

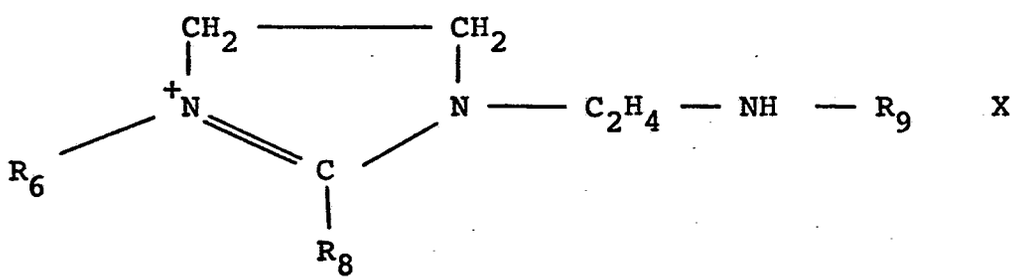


wherein R_5 represents a C_8-C_{24} alkyl or alkenyl group,

R_6 represents hydrogen, a C_1-C_{12} alkyl, alkenyl or hydroxyalkyl group, an aryl group, a C_{1-6} alkylaryl group, or a poly(ethylene oxide) group having from 2 to 20 ethylene oxide units, R_7, R_8 individually represent hydrogen, a C_1-C_4 alkyl, alkenyl or hydroxyalkyl group or a poly(ethylene oxide) group having from 2 to 20 ethylene oxide units and X is as defined above.

Highly preferred materials of this general type include the tallow trimethyl ammonium salts, cetyl trimethyl ammonium salts, myristyl trimethyl ammonium salts, coconutalkyl trimethyl ammonium salts, stearyl dimethyl ammonium salts, cetyl dimethyl ammonium salts, myristyl dimethyl ammonium salts, coconutalkyl dimethyl ammonium salts, oleyl methyl ammonium salts, palmityl methyl ammonium salts, myristyl methyl ammonium salts, lauryl methyl ammonium salts, dodecyl dimethyl hydroxyethyl ammonium salts, dodecyl dimethyl hydroxypropyl ammonium salts, myristyl dimethyl hydroxyethyl ammonium salts, dodecyl dimethyl dioxyethylenyl ammonium salts, myristyl benzyl hydroxyethyl methyl ammonium salts, coconutalkyl benzyl hydroxyethyl methyl ammonium salts, dodecyl dihydroxyethyl methyl ammonium salts, cetyl dihydroxyethyl methyl ammonium salts, and stearyl dihydroxyethyl methyl ammonium salts.

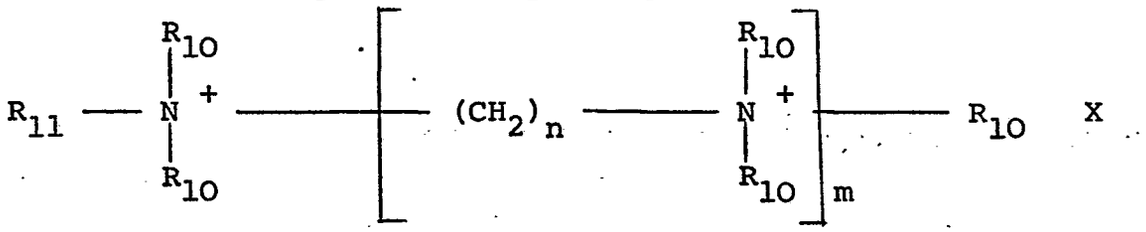
Highly preferred water-soluble imidazolinium materials are represented by the general formula



or acids salts thereof,

wherein R_6, R_7, R_8, R_9 and X were defined earlier. Preferred imidazolinium salts of this general formula include the compound in which R_6 is methyl, R_8 is tallowyl and R_9 is hydrogen and the compound in which R_6 is methyl, R_8 is palmitoyl and R_9 is hydrogen.

Highly preferred water-soluble polyammonium cation materials are represented by the general formula:



wherein R_{11} is selected from an alkyl or alkenyl group having from 12 to 24, preferably from 16 to 20 carbon atoms in the alk(en)yl chain, $R_{11}CO-$ and $R_{11}-O-(CH_2)_n-$; each R_{10} is independently selected from hydrogen, $-(C_2H_4O)_pH$, $-(C_3H_6O)_qH$, $-(C_2H_4O)_r(C_3H_6O)_sH$, a C_{1-3} alkyl group and the group $-(CH_2)_n-N(R')_2$, wherein R' is selected from hydrogen, $-(C_2H_4O)_pH$, $-(C_2H_4O)_pH$, $-(C_2H_4O)_p(C_3H_6O)_qH$ and C_{1-3} alkyl; n is an integer from 2 to 6, preferably 2 or 3; m is an integer from 1 to 5, preferably 1 or 2; p,q,r, and s are each a number such that the total p+q+r+s in the molecule does not exceed 25 (preferably, each p and q is 1 or 2 and each r and s is 1); and X represents one or more anions having total charge balancing that of the nitrogen atoms.

Preferred water-soluble cationic materials are alkoxylated and contain not more than one $-C_2H_4OH$ or $-C_3H_6OH$ group attached to each nitrogen atom, except that up to two of these groups can be attached to a terminal nitrogen atom which is not substituted by an alkyl group having from 10 to 24 carbon atoms.

Polyamine species suitable for use herein include:

N-tallowyl,N,N',N'-tris(2-hydroxyethyl)1,3-propanediamine di-hydrochloride or dibenzoate;

N-soybean alkyl 1,3-propane diammonium sulfate;

N-stearyl,N,N'-di(2-hydroxyethyl)-N'-(3-hydroxypropyl)-1,3-propanediamine dihydrofloride;

N-cocoyl N,N,N',N',N'-pentamethyl-1,3-propane diammonium dichloride or di-methosulfate;

N-oleyl N,N',N'-tris (3-hydroxypropyl)-1,3-propanediamine dihydrofluoride;

N-stearyl N,N',N'-tris(2-hydroxyethyl) N,N'-dimethyl-1,3-propanediammonium dimethylsulfate;

N-palmityl N,N',N'-tris(3-hydroxypropyl)-1,3-propane-diamine dihydrobromide;

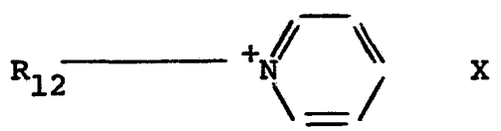
N-(stearyloxypropyl) N,N',N'-tris(3-hydroxypropyl)1,3-propanediammonium diacetate;

N-tallowyl N-(3-aminopropyl)1,3-propanediamine tri-hydrochloride;

N-oleyl N-[N",N" bis(2-hydroxyethyl)3-aminopropyl]N',N'-bis(2-hydroxyethyl)1,3 diaminopropane trihydrofluoride;

N-tallowyl diethylene triamine trihydrochloride.

The water-soluble cationic surfactant herein can also be represented by alkyl pyridinium salts having the following formula:



wherein R_{12} is a C_{10}-C_{24}, preferably C_{16} or C_{18} alkyl radical and X is a suitable anion as defined hereinbefore, preferably a halide, especially chloride or bromide.

It should be understood, of course, that water-soluble cationic surfactants of the amine-salt class can be added in the form of the neutral amine followed by pH adjustment to within the range from about pH4 to about pH8.

The Hydrophobic Adjunct

The hydrophobic adjunct is selected from non-cyclic hydrocarbons, fatty acid esters of monohydric alcohols and mixtures thereof, each component having a total of from 10 to 40 carbon atoms. The hydrophobic adjunct is present in an amount relative to the insoluble cationic softener and the water-soluble cationic and/or nonionic surfactant, to provide a dispersion of anisotropic softener phase in isotropic aqueous surfactant phase.

The first class of hydrophobic adjunct is represented by non-cyclic hydrocarbons having from 10 to 40, preferably from 12 to 24 , more preferably from 12 to 20 carbon atoms.

Preferably, hydrocarbons useful in the present invention are paraffins or olefins, but other materials, such as alkynes and halo-paraffins, for example myristyl chloride or stearyl bromide, are not excluded. Materials known generally as paraffin oil, soft paraffin wax and petrolatum are especially suitable. Examples of specific materials are tetradecane, hexadecane, octadecane and octadecene. Preferred commercially-available paraffin mixtures include spindle oil and light oil and technical grade mixtures of C_{14}/C_{17} and C_{18}/C_{20} n-paraffins.

The second class of hydrophobic adjunct is represented by fatty acid esters having a total of 10 to 40 carbon atoms. Preferred materials are esters of C_8-C_{24} fatty acids with mono-hydric alcohols having from 1 to 8, especially from 1 to 4 carbon atoms.

The mono-hdyric alcohol portion of the ester can be represented by methanl, ethanol, n-propanol, iso-propanol, n-butanol, iso-butanol, t-butanol, 2-ethyl-hexanol and iso-octanol.

Examples of such materials are methyl laurate, ethyl stearate, isopropyl myristate, isopropyl palmitate.

iso-butyl stearate, isopropylstearate, 2-ethylhexyl laurate and isooctyl myristate. Of the above, iso-butyl stearate is highly preferred.

Of all the above, paraffins having from 12 to 20 carbon atoms constitute the preferred adjunct. However, mixtures of paraffins and fatty acid esters in a 3:1 to 1:3 weight ratio are also effective.

Apart from enhancing the phase stability of the composition, the hydrophobic adjunct acts to lower the viscosity of the composition and because each of the materials has a long fatty chain, the agent does contribute to some extent to the softening performance of the composition, a feature which is not shared by other known viscosity control agents, for example electrolytes and low molecular weight solvent materials. Compositions of the present invention also have enhanced dispersibility in cold water and exhibit less dispenser residues than conventional fabric softening composition based solely on a cationic fabric softener.

Optional Ingredients

In addition to the above-mentioned components, the compositions may contain other textile treatment or conditioning agents. Such agents include silicones, as for example described in German Patent Application DOS 26 31 419 incorporated herein by reference.

The optional silicone component can be used in an amount of from about 0.1% to about 6%, preferably from 0.5% to 2% of the softener composition.

A further optional component of the present composition is a fatty acid ester of a polyhydric alcohol, for instance a C_{12}-C_{22} fatty acid ester of ethylene glycol, propylene glycol, glycerol, diglycerol, xylitol, sucrose, erythritol, pentaerythritol, sorbitol or sorbitan. These esters, specific examples

of which include ethyleneglycol monostearate, propyleneglycol monostearate, glyceryl monostearate and glyceryl distearate, can provide an additional softening facility. However, in as much as such fatty acid esters are relatively hydrophilic and indeed are emulsifying materials in their own rights, it is desirable to include such materials in a level of no more than about 4% by weight or in a weight ratio with respect to the cationic softener of no more than about 2:3.

The compositions herein can contain other optional ingredients which are known to be suitable for use in textile sogteners at usual levels for their known functions. Such adjuvants include emulsifiers, perfumes, preservatives, germicides, colorants, dyes fungicides, stabilizers, brighteners and opacifiers. These adjuvants, if used, are normally added at their conventional low levels.

The composition of the invention can also comprise additional viscosity control agents, such as 1% to 10% of lower alcohols, especially ethanol and isopropanol, and electrolytes, for example calcium chloride, at levels of from 100 to 1000 ppm. It is a feature of the invention, however, that such materials can be reduced or eliminated completely from the instant compositions.

The compositions can normally be prepared by mixing the ingredients together in water, heating to a temperature of about 60°C and agitating for 5-30 minutes.

The pH of the compositions is generally adjusted to be in the range from about 3 to about 8, preferably from about 4 to about 6. In this preferred pH range, it will be understood that the neutralization of amines or polyamines in the composition can be incomplete.

When compositions of the present invention are added to the rinse liquor, a concentration from about 10 ppm to 1000 ppm, preferably from about 50 ppm to about 500 ppm, of total active ingredient is appropriate.

The following examples illustrate the invention. In the Examples, the following abbreviations are used:

Ditallow dimethyl ammonium chloride	DTDMAC
3-methyl-1-(2-tallowylamido)ethyl-2-tallowyl-4, 5-dihydroimidazolinium methosulphate	DTIM
Tallow trimethyl ammonium chloride	MTTMAC
3-methyl-(2-amino)ethyl-2 tallowyl-4,5-dihydroimidazolinium methosulphate	MTIM
Tallow dimethyl ammonium chloride	MTDMAC
N-tallowyl-N,N',N'-tris(2-hydroxyethyl)-1, 3-propane diamine	MTHPD
Coconut alkyl trimethyl ammonium chloride	MCTMAC
Cetyl pyridinium chloride	CPC
Condensation product of tallow alcohol with an average of 11 moles of ethylene oxide	TAE_{11}
Glyceryl monostearate	GMS

EXAMPLES 1 to 1X

Concentrated liquid fabric softeners were prepared having the compositions indicated below, by dispersing the active ingredients in water at about 60°C.

	I	II	III	IV	V	VI	VII	VIII	IX
DTDMAC	-	-	-	-	7.2	7.2	7.2	-	1.8
DTIM	8.0	8.0	8.0	8.0	-	-	-	10.0	5.6
MTTMAC	-	0.5	-	-	1.0	0.8	1.0	-	0.2
MTIM	-	-	-	-	-	-	-	-	1.4
MTDMAC	-	-	-	0.5	-	-	-	-	-
MTHPD	1.0	-	-	-	-	-	-	-	-
MCTMAC	-	-	-	-	-	-	-	2.5	-
CPC	-	-	0.5	-	-	-	-	-	-
TAE_{11}	-	-	-	-	1.0	-	-	0.5	-
C_{14}-C_{17} technical paraffin	2.5	2.5	-	-	2.5	-	4.0	-	2.5
Octadecane	-	-	2.5	-	-	2.5	-	1.0	-
Water & minors	To 100								

The above compositions had good phase stability, low viscosity, good dispersibility and excellent softening characteristics compared with compositions containing no

hydrophobic adjunct or no water-soluble cationic or nonionic surfactants or with compositions in which the active system contains a major proportion of hydrophobic adjunct and/or soluble surfactant.

EXAMPLES X TO XVII

Concentrated fabric softeners were prepared in analogous manner with the compositions indicated below.

	X	XI	XII	XIII	XIV	XV	XVI	XVII
DTDMAC	-	-	-	-	-	4.0	12.0	6.0
DTIM	12.0	14.5	13.0	13.5	13.0	7.0	-	6.0
MTTMAC	-	-	-	-	-	0.5	1.0	0.5
MTIM	3.0	4.5	3.0	3.5	3.0	2.0	-	1.0
MTDMAC	-	-	-	-	-	-	4.0	-
MTHPD	-	-	-	-	-	-	1.0	-
MCTMAC	-	-	-	-	-	-	-	1.0
CPC	-	-	-	-	-	-	-	2.0
TAE_{11}	-	-	-	-	-	-	-	2.0
C_{14}-C_{17} technical paraffin	5.0	10.0	4.0	5.0	12.0	-	-	3.0
Octadecane	-	-	-	-	-	2.0	-	-
Isobutyl Stearate	5.0	-	-	6.0	-	-	2.0	-
Isopropyl Palmitate	-	-	-	-	-	2.0	-	-
Iso-octyl Stearate	-	-	4.0	-	-	-	-	-
Calcium Chloride (ppm)	500	850	-	-	-	-	-	-
Water, Perfume & Minors	To 100							

The above compositions were stable dispersions with low viscosity, good dispersibility and excellent softening characteristics compared with compositions containing no hydrophobic adjunct or soluble surfactant or with compositions in which the active system contains a major proportion of the hydrophobic adjunct and/or soluble surfactant.

EXAMPLES XVIII TO XXIII

Aqueous fabric softening compositions were prepared according to the following formulae:

	XVII	XIX	XX	XXI	XXII	XXIII
DTDMAC	4.5	-	3.5	2.0	2.0	3.0
DTIM	-	3.0	-	3.0	2.0	-
MTTMAC	0.55	-	-	-	-	-
MTIM	-	0.6	-	0.3	-	-
MTDMAC	-	-	-	-	-	0.1
MTHPD	-	-	0.35	-	-	-
MCTMAC	-	-	-	-	0.2	-
TAE_{11}	-	-	-	0.5	-	-
C_{14}-C_{17} technical paraffin	-	1.0	-	-	0.5	0.8
C_{18}-C_{20} n-paraffin	1.5	-	0.5	-	-	-
Octadecane	-	-	-	1.5	-	-
Isobutyl stearate	-	-	-	-	0.5	-
GMS	-	-	1	-	-	0.5
Water, perfume and minors	To 100					

The above compositions were stable dispersions with low viscosity, good dispersibility and excellent softening characteristics compared with compositions containing no hydrophobic adjunct or soluble surfactant or with compositions in which the active system contains a major proportion of the hydrophobic adjunct and/or soluble surfactant.

CLAIMS

1. An aqueous fabric softening composition characterized by:-

(a) from 2% to 22% by weight of a water-insoluble cationic fabric softener,

(b) from 0.05% to 8% by weight of a water-soluble cationic or nonionic surfactant or mixture thereof, and

(c) from 0.25% to 15% by weight of a C_{10}-C_{40} non-cyclic hydrocarbon, or of a fatty acid ester of a monohydric alcohol, said ester having a total of 10 to 40 carbon atoms, or of a mixture thereof,

wherein the weight ratio of (a) to (b) is in the range from 100:1 to 5:2, and the weight ratio of (a) to (c) is in the range from 20:1 to 5:4.

2. A composition according to Claim 1 characterized in that the cationic fabric softener is:-

(i) A di-C_{12}-C_{24} alkyl or alkenyl mono- or poly-ammonium salt,

(ii) A di-C_{12}-C_{24} alkyl or alkenyl imidazolinium salt, or

(iii) a mixture thereof.

3. A composition according to Claim 1 or 2 characterized in that the water-soluble cationic surfactant is:-

(i) a mono-C_8-C_{24} alkyl or alkenyl mono- or poly-ammonium salt,

(ii) a mono-C_8-C_{24} alkyl or alkenyl imidazolinium salt,

(iii) a mono-C_8-C_{24} alkyl or alkenyl pyridinium salt, or

(iv) a mixture thereof.

4. A composition according to any preceding Claim characterized in that the water-soluble nonionic surfactant has the general formula $RO(CH_2CH_2O)_nH$ wherein R is a C_{8-20} alkyl or alkenyl group, and n is from 2 to 100.

5. A composition according to any preceding Claim characterized in that the water-insoluble cationic fabric softener and the water-soluble cationic or nonionic surfactant are in a weight ratio of from 20:1 to 4:1.

6. A composition according to any preceding Claim characterized in that the water-insoluble cationic fabric softener and the non-cyclic hydrocarbon are in a weight ratio of from 8:1 to 2:1.

7. A composition according to any preceding Claim characterized by:-

(a) from 2% to 6% by weight of a water-insoluble di-C_{12}-C_{24} alkyl or alkenyl mono-quaternary ammonium salt,

(b) from 0.05 to 1% by weight of a water-soluble cationic surfactant which is:-

(i) a mono-C_8-C_{24} alkyl or alkenyl mono-quaternary salt,

(ii) a mono-C_8-C_{24} alkyl or alkenyl imidazolinium salt, or

(iii) a mixture thereof, and

(c) from 0.25% to 3 % by weight of a C_{12}-C_{24} paraffin or paraffin mixture,

wherein the weight ratio of (a) to (b) is in the range from 20:1 to 4:1 and the weight ratio of (a) to (c) is in the range from 5:1 to 2:1.

8. A composition according to any of Claims 1 to 6 characterized by:-

(a) from 6% to 12% by weight of a water-insoluble cationic fabric softener which is a mixture of:-

(i) a di-C_{12}-C_{24} alkyl or alkenyl mono-quaternary ammonium salt, and

(ii) a di-C_{12}-C_{24} alkyl or alkenyl imidazolinium salt,

wherein the weight ratio of (i) to (ii) is in the range from 1:6 to 1:1,

(b) from 0.5 to 6% by weight of a water-soluble cationic surfactant which is:-

(i) a mono-C_8-C_{24} alkyl or alkenyl mono-quaternary ammonium salt,

(ii) a mono-C_8-C_{24} alkyl or alkenyl imidazolinium salt, or

(iii) a mixture thereof, and

(c) from 1% to 6% by weight of a C_{12}-C_{20} paraffin or paraffin mixture,

wherein the weight ratio of (a) to (b) is in the range from 10:1 to 5:2, and the weight ratio of (a) to (c) is in the range from 5:1 to 5:2.

9. A composition according to any one of Claims 1 to 6 characterized by:-

(a) from 1 % to 22% of a water-insoluble di-C_{12}-C_{24} alkyl or alkenyl imidazolinium salt,

(b) from 2.0% to 8% of a water-soluble cationic surfactant which is:-

(i) a mono-C_8-C_{24} alkyl or alkenyl mono-quaternary ammonium salt,

(ii) a mono-C_8-C_{24} alkyl or alkenyl imidazolinium salt, or

(iii) a mixture thereof, and

(c) from 6% to 12% of a 3:1 to 1:3 mixture of:-

(i) a C_{12}-C_{20} paraffin or paraffin mixture, and

(ii) an ester of a C_{12}-C_{24} fatty acid with a monohydric alcohol having from 1 to 8 carbon atoms,

wherein the weight ratio of (a) to (b) is in the range from 4:1 to 5:2, and the weight ratio of (a) to (c) is in the range from 7:2 to 5:4.

10. A composition according to any one of Claims 1 to 9 wherein the composition is in the form of a dispersion of an anisotropic softener phase in an isotropic surfactant phase.

European Patent Office

EUROPEAN SEARCH REPORT

0018039
Application number

EP 80 20 0320.2

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	DE - A1 - 2 830 173 (PROCTER & GAMBLE EUROPEAN TECHNICAL CENTER) * claims 1, 3, 4, 7, 11 to 15 * & FR - A1 - 2 400 585 --	1,2,6
X	DE - A1 - 2 631 114 (PROCTER & GAMBLE CO.) * claims 1, 10, 21 * --	1
X,P	US - A - 4 155 855 (PROCTER & GAMBLE CO.) * claims 1, 8 to 10 * --	1-3,9
	FR - A1 - 2 257 728 (PROCTER & GAMBLE CO.) * claims 1, 2; page 8, lines 19 to 23; page 9, lines 29 to 36 * --	1,2
D	US - A - 3 793 196 (LION FAT & OIL CO.) * complete document * --	
A	FR - A2 - 2 398 832 (HENKEL KG) * complete document * ----	

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

C 11 D 1/62
C 11 D 1/645
D 06 M 13/46

TECHNICAL FIELDS SEARCHED (Int.Cl.³)

C 11 D 1/00
C 11 D 3/00
D 06 M 13/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	10-07-1980	SCHULTZE

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