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(54) **FABRIC CONDITIONING COMPOSITIONS**

WÄSCHEWEICHSPÜLER

COMPOSITIONS DE CONDITIONNEMENT DE TEXTILES

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(73) Proprietors:
- **Unilever PLC**
  London
  EC4Y 0DY (GB)
  Designated Contracting States:
  CY GB IE
- **Unilever N.V.**
  3013 AL Rotterdam (NL)
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(72) Inventors:
- **MOHAMMADI, Mansur Sultan**
  Bebington,
  Wirral Merseyside CH63 3JW (GB)
- **WRIGHT, Janice Elaine**
  Bebington,
  Wirral Merseyside CH63 3JW (GB)

(74) Representative: **Chisem, Janet et al**
Unilever Patent Group
Colworth House
Sharnbrook
Bedford MK44 1LQ (GB)

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Description

Field of the Invention

[0001] The present invention relates to fabric conditioning compositions. More specifically, the invention relates to thick and creamy fabric softening compositions comprising a softener of low phase volume and an associative thickener.

Background of the Invention

[0002] It is well known to provide liquid fabric conditioning compositions that soften treated fabric, i.e. liquid fabric softeners. Such compositions are typically added to fabric in the rinse cycle of the wash process. Consumer preference is for liquid fabric softeners that are thick and creamy; however, attaining this goal can lead to problems, particularly with regard to the dispensing and storage stability of the composition. It is often found that thick and creamy liquid softeners dispense poorly; this can lead to wasted product and, when used in automatic washing machines, messy residues being left the dispenser draw of the machine. A further problem associated with thick and creamy fabric softeners is poor storage stability, the desirable rheological properties of the composition being lost upon storage. A particularly common rheological problem is product thickening on storage, especially at elevated temperature or low temperature.

[0003] EP 331,237 (Unilever, 1989) discloses liquid fabric softeners comprising thickening polymers that act as associative thickeners. However, this publication does not disclose compositions comprising 5% or greater of cationic softening agent having a phase structure adjusted by nonionic surfactant and having a phase volume of less than 0.75, nor does it suggest the benefits that such micro-structure can lead to in liquid softeners comprising cationic softening agent and associative thickener (vide *infra*).

[0004] Numerous publications disclose liquid fabric softeners comprising a cationic softening agent and a nonionic surfactant, an example being EP 523,922 B1 (Unilever, 1992). WO 03/012019 (Unilever, 2002) also discloses associative thickener as an optional component; however, compositions comprising 5% or greater of cationic softening agent having a phase volume of less than 0.75 are not disclosed nor envisaged. WO 01/46360 (Unilever, 2000) discloses liquid fabric softeners comprising a cationic softening agent, a nonionic surfactant and an optional associative thickener; however, this publication is also silent regarding systems comprising 5% or greater of cationic softening agent that have a phase volume of less than 0.75.

objects of the Invention

[0005] It is an object of the present invention to provide a fabric conditioning composition that appears thick and creamy and yet dispenses efficiently and gives a good degree of softness to treated fabrics. It is a further object of the present invention to provide a fabric conditioning composition having the aforementioned benefits and good storage stability.

Summary of the Invention

[0006] According to a first aspect of the present invention, there is provided a liquid fabric softener composition comprising:

i) an aqueous continuous phase;
ii) a disperse phase containing a cationic softening agent in an amount of at least 5% by weight of the total composition;
iii) at least 0.05% by weight of the total composition of an non-ionic surfactant;
iv) a fatty complexing agent selected from C_8 to C_{22} fatty acids and C_8 to C_{22} fatty alcohols **characterised in that** the composition comprises; and
v) an associated thickener which is a hydrophobically modified cellulose ether and

wherein the disperse phase has a phase volume of 0.75 or less.

[0007] According to a second aspect of the present invention, there is provided a method for the treatment of fabrics comprising contacting fabrics with a liquid fabric softening composition according to the first aspect of the invention or any of the particular variants thereof disclosed in the following description.

[0008] According to a third aspect of the present invention, there is provided a method for the manufacture of a liquid fabric softening composition as defined above comprising the steps of dispersing a cationic softening agent and a nonionic surfactant in an aqueous continuous phase, reducing the phase volume of the disperse phase, and using an associative thickener to thicken the composition, wherein the disperse phase is reduced to a phase volume of 0.75 or less and the cationic softening agent comprises 5% or greater of the total composition.

[0009] In the context of the present invention, the term "comprising" means "including" and is non-exhaustive.

Detailed Description of the Invention

[0010] The compositions of the invention are highly effective fabric softeners, having 5% or greater by weight of cationic softening agent present. They appear thick and creamy and yet have surprisingly good storage stability and dispensing efficiency, leaving little or no residue in the conditioner portion of the dispenser draw of a conventional automatic washing machine. It is believed that the combination of a disperse phase comprising 5% or greater cationic softening agent and a phase volume of 0.75 or less, an associative thickener, and a non-ionic surfactant leads to a product micro-structure that enables the above benefits to be attained. The product micro-structure is believed to comprise dispersed fragments of cationic softening agent, generally in lamellar phase, stabilised by nonionic surfactant and linked together, under low shear conditions (for example, at shear rates of from 2 to 20 /s), by the associative thickener.

[0011] The benefits given by the compositions of the invention relate to their rheological properties. At a shear rate relevant to the pouring of the composition from a bottle, it is important that the composition appears thick and creamy - at such a shear rate, for example at 20 /s, the viscosity of the composition is preferably from 200 to 450 mPa.s. At lower shear rates such as 2 /s, which are believed to be relevant to the dispensing of the formulation, the composition may have a viscosity as high as from 600 to 1100 mPa.s and yet still dispense efficiently. At higher shear rates, however, the composition will generally have a lower viscosity - at 106 /s it is preferred that the viscosity is from 90 to 200 mPa.s.

[0012] Throughout this specification it should be understood that all values requiring measurement, in particular viscosity values, relate to measurements made at 20°C and 1 atmosphere pressure.

[0013] By measuring the viscosity (η) at a range of shear rates (γ) it is possible to obtain a value for the infinite shear rate viscosity (η_∞) of a composition by using the Sisco model:

$$\eta = \eta_\infty + K\dot{\gamma}^{n-1}$$

where 'K' is the consistency and 'n' is the power law index.

[0014] The infinite shear rate viscosity may then be used to obtain a value for the phase volume ($\varnothing$) of a disperse phase within a composition as a whole by using a Kreigher-Dougherty equation:

$$\eta_\infty = \eta_c(1 - \varnothing/\varnothing_m)^{-2}$$

where η_c is the viscosity of the continuous phase and $\varnothing_m$ is the maximum volume fraction; the values of both of these terms can be equated to unity for the aqueous based liquid compositions of the present invention.

[0015] Details of the above equations and their usage may be found in basic rheology textbooks such as "Rheology for Chemists, An Introduction", by J. W. Goodwin and R. W. Hughes, published by the Royal Society of Chemists in 2000 and "Colloidal Dispersions" by W. B. Russel et al, published by Cambridge University Press in 1989.

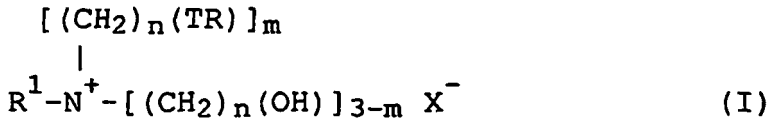
[0016] The phase volume of the disperse phase may be thought of as the volume of the total composition occupied by the disperse phase at infinite shear rate. The compositions of the present invention have a phase volume of 0.75 or less. Only at such low phase volumes can the desired efficiency of dispensing be attained. The phase volume is preferably 0.70 or less. Fabric softening compositions comprising 5% or greater of cationic softening agent do not generally have such low phase volumes, unless induced by processing and/or the additives.

The cationic softening agent

[0017] The cationic softening agent is typically a quaternary ammonium compound ("QAC"), in particular one having two C_{12-28} groups connected to the nitrogen head group that may independently be alkyl or alkenyl groups, preferably being connected to the nitrogen head group by at least one ester link, and more preferably by two ester links.

[0018] The average chain length of the alkyl and/or alkenyl groups is preferably at least C_{14} and more preferably at least C_{16}. It is particularly preferred that at least half of the groups have a chain length of C_{18}. In general, the alkyl and/or alkenyl groups are predominantly linear.

[0019] A first group of QACs suitable for use in the present invention is represented by formula (I):

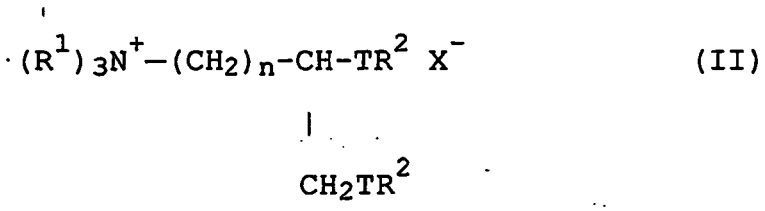


wherein each R is independently selected from a C_{5-35} alkyl or alkenyl group; R^1 represents a C_{1-4} alkyl, C_{2-4} alkenyl or a C_{1-4} hydroxyalkyl group; T is generally O-CO. (i.e. an ester group bound to R via its carbon atom), but may alternatively be CO.O (i.e. an ester group bound to R via its oxygen atom); n is a number selected from 1 to 4; m is a number selected from 1, 2, or 3; and X^- is an anionic counter-ion, such as a halide or alkyl sulphate, e.g. chloride or methylsulphate. Di-esters variants of formula I (i.e. m = 2) are preferred and typically have mono- and triester analogues associated with them. Such materials are particularly suitable for use in the present invention.

[0020] Especially preferred agents are di-esters of triethanolammonium methylsulphate, otherwise referred to as "TEA ester quats.". Commercial examples include Prapagen TQL, ex Clariant, and Tetranyl AHT-1, ex Kao, (both di-[hardened tallow ester] of triethanolammonium methylsulphate), AT-1 (di-[tallow ester] of triethanolammonium methylsulphate), and L5/90 (di-[palm ester] of triethanolammonium methylsulphate), both ex Kao, and Rewoquat WE15 (a di-ester of triethanolammonium methylsulphate having fatty acyl residues deriving from C_{10-}

[0021] C_{20} and C_{16}-C_{18} unsaturated fatty acids), ex Witco Corporation.

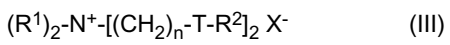
[0022] The second group of QACs suitable for use in the invention is represented by formula (II):



wherein each R^1 group is independently selected from C_{1-4} alkyl, hydroxyalkyl or C_{2-4} alkenyl groups; and wherein each R^2 group is independently selected from C_{8-28} alkyl or alkenyl groups; and wherein n, T, and X^- are as defined above.

[0023] Preferred materials of this second group include 1,2 *bis*[tallowoyloxy]-3-trimethylammonium propane chloride, 1,2 *bis*[hardened tallowoyloxy]-3-trimethylammonium propane chloride, 1,2-*bis*[oleoyloxy]-3-trimethylammonium propane chloride, and 1,2 *bis*[stearoyloxy]-3-trimethylammonium propane chloride. Such materials are described in US 4,137,180 (Lever Brothers). Preferably, these materials also comprise an amount of the corresponding mono-ester.

[0024] A third group of QACs suitable for use in the invention is represented by formula (III):



wherein each R^1 group is independently selected from C_{1-4} alkyl, or C_{2-4} alkenyl groups; and wherein each R^2 group is independently selected from C_{8-28} alkyl or alkenyl groups; and n, T, and X^- are as defined above. Preferred materials of this third group include bis(2-tallowoyloxyethyl)dimethyl ammonium chloride and hardened versions thereof.

[0025] A fourth group of QACs suitable for use in the invention is represented by formula (IV):



wherein each R^1 group is independently selected from C_{1-4} alkyl, or C_{2-4} alkenyl groups; and wherein each R^2 group is independently selected from C_{8-28} alkyl or alkenyl groups; and X^- is as defined above. Preferred materials of this fourth group include di(hardened tallow)dimethylammonium chloride.

[0026] The iodine value of the softening agent is preferably from 0 to 20, more preferably from 0 to 4, and most preferably from 0 to 2. Essentially saturated material, i.e. having an iodine value of from 0 to 1, is used in especially high performing compositions. At low iodine values, the softening performance is excellent and the composition has improved resistance to oxidation and associated odour problems upon storage. To optimise the properties of compositions having agents of low iodine value, it is preferred that the level and nature of the nonionic surfactant are carefully selected (*vide infra).*

[0027] Iodine value is defined as the number of grams of iodine absorbed per 100 g of test material. NMR spectroscopy is a suitable technique for determining the iodine value of the softening agents of the present invention, using the method

described in Anal. Chem., 34, 1136 (1962) by Johnson and Shoolery and in EP 593,542 (Unilever, 1993).

[0028] The softening agent is present in the compositions of the invention at a level of 5% or greater by weight of the total composition. For even greater softening effect, this level may be 8% or greater; whilst for particularly high performance, this level may be 11% or greater. At these higher concentrations, which are also desirable for supply chain and environmental reasons, the low dispenser residues found with the compositions of the present invention is particularly relevant and unexpected.

[0029] For ease of formulation, the amount of softening agent is generally 50% or less, particularly 40% or less, and especially 30% or less by weight of the total composition.

The nonionic surfactant

[0030] Suitable nonionic surfactants include alkoxylated materials, particularly addition products of ethylene oxide and/or propylene oxide with fatty alcohols, fatty acids and fatty amines.

[0031] Preferred materials are of the general formula:

$$R\text{-}Y\text{-}(CH_2CH_2O)_zH$$

[0032] Where R is a hydrophobic moiety, typically being an alkyl or alkenyl group, said group being linear or branched, primary or secondary, and preferably having from 8 to 25, more preferably 10 to 20, and most preferably 10 to 18 carbon atoms; R may also be an aromatic group, such as a phenolic group, substituted by an alkyl or alkenyl group as described above; Y is a linking group, typically being O, CO.O, or CO.N(R^1), where R^1 is H or a $C_{1\text{-}4}$ alkyl group; and z represents the average number of ethoxylate (EO) units present, said number being 8 or more, preferably 10 or more, and most preferably 15 to 30.

[0033] Preferably the nonionic surfactant has an HLB of from 7 to 20, more preferably from 10 to 20, and most preferably from 15 to 20.

[0034] Examples of suitable nonionic surfactants include the ethoxylates of mixed natural or synthetic alcohols in the "coco" or "tallow" chain length. Preferred materials are condensation products of coconut fatty alcohol with 15-20 moles of ethylene oxide and condensation products of tallow fatty alcohol with 10-20 moles of ethylene oxide.

[0035] The ethoxylates of secondary alcohols such as 3-hexadecanol, 2-octadecanol, 4-eicosanol, and 5-eicosanol may also be used. Exemplary ethoxylated secondary alcohols have formulae C_{12}-EO(20); C_{14}-EO(20); C_{14}-EO(25); and C_{16}-EO(30)

[0036] Polyol-based nonionic surfactants may also be used, examples including sucrose esters (such as sucrose monooleate), alkyl polyglucosides (such as stearyl monoglucoside and stearyl triglucoside), and alkyl polyglycerols.

[0037] A particular nonionic surfactant may be useful in the present compositions alone or in combination with other nonionic surfactants. The preferred amounts of nonionic surfactant indicated below refer to the total amount of such materials that are present in the composition.

[0038] The nonionic surfactant is present in an amount from 0.05 to 10%, more preferably 0.1 to 5%, and most preferably 0.35 to 3.5%, based on the total weight of the composition.

[0039] When the softening agent has an iodine value from 0 to 20, particularly from 0 to 4 and especially from 0 to 2, it is preferred that nonionic surfactant having an HLB of 15-20 is present at a level of 0.05% or greater, more preferably 0.1% or greater, and most preferably 0.35% or greater, based on the total weight of the composition.

The associative thickener

[0040] An associative thickener is an essential component of the compositions of the invention, serving to promote the desired thick and creamy appearance. The associative thickener is a hydrophobically modified cellulose ether, e.g. as described in GB 2,043,646 (Hercules) and disclosed in fabric conditioning compositions in EP 331,237 B1 (Unilever). Such materials are typically nonionic polymers and have a sufficient degree of nonionic substitution selected from the class consisting of methyl, hydroxyethyl and hydroxypropyl to cause them to be water-soluble and which are further substituted with one or more hydrocarbon radicals having from 10 to 24 carbon atoms, in an amount from 0.2% by weight to an amount which renders the cellulose ether less than 1% by weight soluble in water. The nonionic cellulose ether that forms the backbone' of the hydrophobically modified derivative may be any nonionic water soluble cellulose ether substrate, such as hydroxyethyl cellulose (HEC), hydroxypropyl cellulose (HPC), methyl cellulose, hydroxypropyl methyl cellulose, ethyl hydroxyethyl cellulose or methyl hydroxyethyl cellulose.

[0041] The preferred 'backbone' is HEC.

[0042] Other suitable associative thickeners include the Nexton range (HMHEC), from Aqualon.

[0043] Especially preferred associative thickeners are hydrophobically modified cellulose ethers sold under the trade names Natrosol Plus 100, 250, 331, and 430, by Hercules.

[0044] The molecular weight of the associative thickener is preferably from 1,000 to 1,000,000, more preferably from 50,000 to 500,000 and most preferably from 100,000 to 400,000.

[0045] The associative thickener is typically used at a level of at least 0.0005%, in particular at from 0.0005 to 2%, and especially at from 0.001 to 0.5% by weight of the total composition.

Aqueous continuous phase

[0046] The aqueous continuous phase typically comprises 80% or greater by weight of water; sometimes this figure may rise to 90% or greater, or 95% or greater. The water in the aqueous continuous phase typically comprises 40% or greater by weight of the total formulation; preferably this figure is 60% or greater, more preferably it is 70% or greater.

[0047] The aqueous continuous phase may also comprise water-soluble species, such as mineral salts or short chain (C_{1-4}) alcohols. The mineral salts may aid the attainment of the required phase volume for the composition, as may water soluble organic salts and cationic deflocculating polymers, as described in EP 41,698 A2 (Unilever). Such salts may be present at from 0.001 to 1% and preferably at from 0.005 to 0.1% by weight of the total composition. Examples of suitable mineral salts for this purpose include calcium chloride and magnesium chloride. Short chain alcohols that may be present include primary alcohols, such as ethanol, propanol, and butanol, secondary alcohols such as isopropanol, and polyhydric alcohols such as propylene glycol and glycerol. The short chain alcohol may be added with cationic softening agent during the preparation of the composition.

Fatty complexing agent

[0048] An additional component in the compositions of the present invention is a fatty complexing agent which have a C_8 to C_{22} hydrocarbyl chain present as part of their molecular structure and is selected from fatty C_8 to C_{22} fatty alcohols and C_8 to C_{22} fatty acids. The C_8 to C_{22} fatty alcohols are most preferred. A fatty complexing agent is particularly valuable in compositions comprising a QAC having a single C_{12-28} group connected to the nitrogen head group, such as mono-ester associated with a TEA ester quat. or a softening agent of formula II.

[0049] It is thought that the complexing agent may bind to the single chain QAC described above in preference to the nonionic surfactant and thereby free the nonionic surfactant to stabilised the disperse phase and help reduce its phase volume. Complexing the single chain QAC may also aid the rheological stability of the composition in another manner; the presence of such single chain QACs, particular when present at levels of 10 mole% or greater of the total QAC, can lead to depletion flocculation - addition of a complexing agent has the effect of reducing their free concentration, thereby reducing or eliminating this problem. Enhanced softening performance may also result from the presence of the complex formed between the single chain QAC and the complexing agent.

[0050] Preferred fatty acid complexing agents include hardened tallow fatty acid (available as Pristerene, ex Uniqema).

[0051] Preferred fatty alcohol complexing agents include hardened tallow alcohol (available as Stenol and Hydrenol, ex Cognis, and Laurex CS, ex Albright and Wilson) and behenyl alcohol, a C_{22} fatty alcohol, available as Lanette 22, ex Henkel.

[0052] The fatty complexing agent may be used at from 0.1% to 10%, particularly at from 0.5% to 5%, and especially at from 0.75 to 2% by weight, based on the total weight of the composition.

[0053] When a QAC having a single C_{12-28} group connected to the nitrogen head group is present, the mole ratio of the fatty complexing agent to said single chain QAC is preferably from 1:3 to 3:1, more preferably 1:2 to 2:1, and most preferably 2:3 to 3:2.

Perfume

[0054] The compositions of the invention typically comprise one or more perfumes. The perfume is preferably present in an amount from 0.01 to 10% by weight, more preferably 0.05 to 5% by weight, most preferably 0.5 to 4.0% by weight, based on the total weight of the composition.

Co-softener

[0055] Co-softeners may be used together with the cationic softening agent. When employed, they are typically present at from 0.1 to 20% and particularly at from 0.5 to 10%, based on the total weight of the composition. Preferred co-softeners include fatty esters, and fatty N-oxides.

[0056] Fatty esters that may be employed include fatty monoesters, such as glycerol monostearate, fatty sugar esters, such as those disclosed WO 01/46361 (Unilever).

Further Optional Ingredients

[0057] The compositions of the invention may contain one or more other ingredients. Such ingredients include preservatives (e.g. bactericides), pH buffering agents, perfume carriers, fluorescers, colourants, hydrotropes, antifoaming agents, anti-redeposition agents, soil-release agents, polyelectrolytes, enzymes, optical brightening agents, anti-shrinking agents, anti-wrinkle agents, anti-spotting agents, anti-oxidants, sunscreens, anti-corrosion agents, drape imparting agents, anti-static agents, ironing aids and dyes.

[0058] A particularly preferred optional ingredient is an opacifier or pearlescer. Such ingredients can serve to augment the creamy appearance of the compositions of the invention. Suitable materials may be selected from the Aqusol 0P30X range (ex Rohm and Haas), the PuriColour White range (ex Ciba) and the LameSoft TM range (ex Cognis). Such materials are typically used at a level of from 0.01 to 1% by weight of the total composition.

Product Use

[0059] The compositions of the present invention are preferably rinse conditioner compositions and may be used in the rinse cycle of a domestic laundry process.

[0060] The composition is preferably used in the rinse cycle of a home textile laundering operation, where, it may be added directly in an undiluted state to a washing machine, e.g. through a dispenser drawer or, for a top-loading washing machine, directly into the drum. Alternatively, it can be diluted prior to use. The compositions may also be used in a domestic hand-washing laundry operation.

[0061] It is also possible, though less desirable, for the compositions of the present invention to be used in industrial laundry operations, e.g. as a finishing agent for softening new clothes prior to sale to consumers.

Method of Manufacture

[0062] Formulation according to the invention may be prepared by the method of manufacture described as the third aspect of the invention. In this method, the is should be understood that the dispersing of the cationic softening agent and nonionic surfactant in the aqueous continuous phase may involve dissolution of at least some of the nonionic surfactant in the aqueous continuous phase. The required reduction in the phase volume of the disperse phase may be brought about by any of the means known in the art. Such means may comprise the addition of an electrolyte, such as a mineral salt, and/or milling of the formulation. Milling of the formulation, when employed, is typically performed until 50% or greater, in particular 100% or greater and especially 150% or greater of the batch volume has passed through the mill.

[0063] In a typical method of manufacture, the cationic softening agent, nonionic surfactant, and any optional hydrophobic components such co-softener are heated together until a co-melt is formed. Water is heated and the co-melt is added to the water with stirring. The phase volume of the disperse phase is reduced by the addition of an electrolyte and/or by milling, preferably whilst the mixture is still hot. When the cationic softening agent is present as a lamellar phase dispersion, it is preferred that milling is carried above the L_α-L_β phase transition temperature. The mixture is then thickened by the addition of associative thickener, typically added as an aqueous solution of concentration from 1 to 2% by weight, and is then allowed to cool.

Examples

[0064] The invention will now be illustrated by the following nonlimiting examples. Further modifications will be apparent to the person skilled in the art.

[0065] Examples of the invention are represented by a number. Comparative examples are represented by a letter.

Table 1: Base Formulation for Examples A to E and 1

Component		**Amount (wt.%)**
Prapagen TQL	TEA ester quat., ex Clariant	12.7
Genapol C200	Coconut alcohol polyglycol ether (20 EO), ex Clariant	0.4
Stenol	Hardened tallow fatty alcohol, ex Cognis	1.0
Perfume		0.7
Water and minors		To 100

[0066] The base formulation indicated in Table 1 was prepared by methods standard in the art. The phase volume of the core formulation was then reduced to the levels indicated in Table 2 by shearing the formulation for the number of batch volumes (BV) indicated. Phase volumes were determined by measuring the viscosity at a range of shear rates, using these data to calculate the infinite shear rate viscosity *via* the Sisco model and then using using the Kreigher-Dougherty equation to get a value for the phase volume from the infinite shear rate viscosity so calculated (*vide supra*).

[0067] Associative thickener (Natrosol Plus 331, ex Hercules) was added to Example E to give Example 1. The sensitivity of the dispensing efficiency to the phase volume is clear from the dispenser residue figures indicated in Table 2. These figures were obtained on use of the indicated formulation in a conventional Miele Novotronic automatic washing machine. These figures indicate that by using a suitable formulation of low phase volume, it is possible to add the associative thickener without major detrimental effect upon the dispensing. The addition of the associative thickener gave a formulation of thick and creamy appearance (viscosity 245 mPa.s at 20 /s, in comparison with a value of 71 mPa.s, at the same shear, rate for example E).

Table 2

Example	Polymer wt.%)	Milling (BV)	Phase volume	Dispenser residue (wt.%)
A	0	0	0.81	52.5
B	0	0.5	0.79	20.9
C	0	1	0.69	4.1
D	0	1.5	0.68	2.5
E	0	2	0.65	2.5
1	0.012	2	0.64	2.9

[0068] The phase volume may also be reduced by the addition of mineral salt. Example F (Table 3) was prepared in a similar manner to that used for examples A to E, using 13% of the TEA quat., 0.6% of the nonionic surfactant, 0.6% of the fatty alcohol, and 0.75% of perfume. Calcium chloride and associative thickener were then added to give Examples 2 and 3, as shown in Table 3. The Table also shows the phase volumes for the samples and the dispenser residues resulting from their use in a conventional Miele Novotronic automatic washing machine. Examples 2 and 3 each had a thick and creamy appearance (viscosities at 20 /s of 232 mPa.s and 197 mPa.s, respectively) and yet both gave low dispenser residues, in comparison with Example F.

Table 3

Example	$CaCl_2$ (wt.%)	Polymer (wt.%)	Phase volume	Dispenser residue (wt.%)
F	0	0	0.79	25.7
2	0.01	0.001[1]	0.70	7.8
3	0.01	0.001[2]	0.66	5.3
1. Natrosol Plus 331, ex Hercules, Mw. ca. 370,000. 2. Natrosol Plus 100, ex Hercules.				

[0069] Examples similar to the above have also been prepared using Natrosol Plus 430 (Mw. ca. 470,000). This material also gave compositions having a thick and creamy appearance, that dispensed without leaving excessive residues; however, it was less weight effective than its lower molecular weight analogues.

[0070] In a further series of control experiments, process-thinned compositions were thickened using a continuous phase thickener: Softgel BDA, a cationically modified potato starch, ex Avebe. Thick products could be produced in this manner (having viscosities at 20/s of 290 mPa.s and above), but only at the expense of high dispenser residues (25 wt. % and above), showing the inferiority of continuous phase thickeners when compared with the associative thickeners used in conjunction with the other aspects of the present invention.

Claims

1. A liquid fabric softener composition comprising:

   i) an aqueous continuous phase
   ii) a disperse phase containing a cationic softening agent in an amount of at least 5% by weight of the total composition
   iii) at least 0.05% by weight of the total composition of an non-ionic surfactant
   iv) a fatty complexing agent selected from C_8 to C_{22} fatty acids and C_8 to C_{22} fatty alcohols **characterised in that** the composition comprises
   v) an associated thickener which is a hydrophobically modified cellulose ether and
   wherein the disperse phase has a phase volume of 0.75 or less.

2. A fabric softening composition according to claim 1, having a viscosity at 20 /s of from 200 to 450 mPa.s.

3. A fabric softening composition according to claim 1 or 2, wherein the disperse phase comprises fragments of lamellar phase cationic softening agent stabilised by non-ionic surfactant and linked by associative thickener.

4. A fabric softening composition according to any of preceding claims, having a phase volume of 0.70 or less.

5. A fabric softening composition according to any of preceding claims, wherein the cationic softening agent has an iodine value of from 0 to 20, more preferably 0 to 2.

6. A fabric softening composition according to any of preceding claims, wherein the non-ionic surfactant has an HLB of from 7 to 20, more preferably 15 to 20.

7. A fabric softening composition according to any of the preceding claims, wherein the non-ionic surfactant is present at a level of 0.35% or greater, based on the total weight of the composition.

8. A fabric softening composition as claimed in any preceding claim in which the fatty complexing agent is a C_8 to C_{22} fatty alcohol.

9. A fabric softening composition according to any of preceding claims, wherein the associative thickener has a molecular weight of from 50,000 to 500,000.

10. A fabric softening composition according to any of preceding claims, wherein the associative thickener is present at a level of from 0.001 to 0.5% by weight of the total composition.

11. A fabric softening composition according to any one of the preceding claims, comprising a quaternary ammonium compound having a single C_{12-28} group connected to the nitrogen head group.

12. A fabric softening composition according to claim 11, wherein the mole ratio of the fatty complexing agent to the quaternary ammonium compound having a single C_{12-28} group connected to the nitrogen head group is from 1:3 to 3:1.

13. A method for the treatment of fabrics comprising contacting fabrics with a liquid fabric softening composition according to any of the preceding claims.

14. A method for the manufacture of a liquid fabric softening composition as claimed in any preceding claim comprising the steps of dispersing a cationic softening agent and a non-ionic surfactant in an aqueous continuous phase, reducing the phase volume of the disperse phase, and using an associative thickener to thicken the composition, wherein the disperse phase is reduced to a phase volume of 0.75 or less and the cationic softening agent comprises 5% or greater of the total composition.

15. A method according to claim 14, wherein the phase volume is reduced by the addition of an electrolyte and/or milling the formulation.

Patentansprüche

1. Flüssige Textilweichmacherzusammensetzung, umfassend:

   i) eine wässrige kontinuierliche Phase,
   ii) eine disperse Phase, die einen kationischen Weichmacher in einer Menge von wenigstens 5 Gewichts-% der gesamten Zusammensetzung enthält,
   iii) wenigstens 0,05 Gewichts-% eines nicht-ionischen Tensids, bezogen auf die gesamte Zusammensetzung,
   iv) ein komplexierendes Fettmittel, ausgewählt aus C_8- bis C_{22}-Fettsäuren und C_8- bis C_{22}-Fettalkoholen, **dadurch gekennzeichnet, dass** die Zusammensetzung umfasst
   v) ein assoziiertes Verdickungsmittel, das ein hydrophob modifizierter Cellu-loseether ist, und
   wobei die disperse Phase ein Phasenvolumen von 0,75 oder weniger hat.

2. Textilweichmacherzusammensetzung nach Anspruch 1, die eine Viskosität bei 20/s von 200 bis 450 mPa.s hat.

3. Textilweichmacherzusammensetzung nach Anspruch 1 oder 2, wobei die disperse Phase Fragmente von kationischem Weichmacher als lamellare Phase, stabilisiert durch nicht-ionisches Tensid und verknüpft mit assoziativem Verdickungsmittel, umfasst.

4. Textilweichmacherzusammensetzung nach einem der vorangehenden Ansprüche, die ein Phasenvolumen von 0,70 oder weniger hat.

5. Textilweichmacherzusammensetzung nach einem der vorangehenden Ansprüche, wobei der kationische Weichmacher eine Iodzahl von 0 bis 20, vorzugsweise von 0 bis 2, hat.

6. Textilweichmacherzusammensetzung nach einem der vorangehenden Ansprüche, wobei das nicht-ionische Tensid einen HLB-Wert von 7 bis 20, bevorzugter von 15 bis 20, hat.

7. Textilweichmacherzusammensetzung nach einem der vorangehenden Ansprüche, wobei das nicht-ionische Tensid in einer Konzentration von 0,35 % oder höher, bezogen auf das Gesamtgewicht der Zusammensetzung, vorliegt.

8. Textilweichmacherzusammensetzung nach einem der vorangehenden Ansprüche, wobei das komplexierende Fettmittel ein C_8- bis C_{22}-Fettalkohol ist.

9. Textilweichmacherzusammensetzung nach einem der vorangehenden Ansprüche, wobei das assoziative Verdikkungsmittel ein Molekulargewicht von 50 000 bis 500 000 hat.

10. Textilweichmacherzusammensetzung nach einem der vorangehenden Ansprüche, wobei das assoziative Verdikkungsmittel in einer Konzentration von 0,001 bis 0,5 Gewichts-% der gesamten Zusammensetzung vorliegt.

11. Textilweichmacherzusammensetzung nach einem der vorangehenden Ansprüche, die eine quaternäre Ammoniumverbindung umfasst, welche eine einzelne C_{12-28}-Gruppe an die Stickstoffkopfgruppe gebunden hat.

12. Textilweichmacherzusammensetzung nach Anspruch 11, wobei das Molverhältnis des komplexierenden Fettmittels zu der quaternären Ammoniumverbindung, die eine einzelne C_{12-28}-Gruppe an die Stickstoffkopfgruppe gebunden hat, von 1:3 bis 3:1 ist.

13. Verfahren für die Behandlung von Textilien, umfassend In-Kontakt-Bringen von Textilien mit einer flüssigen Textilweichmacherzusammensetzung nach einem der vorangehenden Ansprüche.

14. Verfahren zur Herstellung einer flüssigen Textilweichmacherzusammensetzung nach einem vorangehenden Anspruch, umfassend die Schritte Dispergieren eines kationischen Weichmachers und eines nicht-ionischen Tensids in einer wässrigen kontinuierlichen Phase, Verringern des Phasenvolumens der dispersen Phase und Verwenden eines assoziativen Verdickungsmittels, um die Zusammensetzung zu verdicken, wobei die disperse Phase auf ein Phasenvolumen von 0,75 oder weniger reduziert wird und der kationische Weichmacher 5 % oder mehr der gesamten Zusammensetzung ausmacht.

15. Verfahren nach Anspruch 14, wobei das Phasenvolumen durch den Zusatz eines Elektrolyten und/oder Vermahlen

der Formulierung verringert wird.

Revendications

1. Composition liquide d'adoucissant pour tissus comprenant :

   i) une phase continue aqueuse
   ii) une phase dispersée contenant un agent adoucissant cationique dans une quantité d'au moins 5 % en poids de la composition totale
   iii) au moins 0,05 % en poids de la composition totale d'un tensioactif non ionique
   iv) un agent complexant gras choisi parmi les acides gras en C_8 à C_{22} et les alcools gras en C_8 à C_{22}, la composition étant **caractérisée en ce qu'**elle comprend
   v) un épaississant associé qui est un éther de cellulose hydrophobiquement modifié et
   dans laquelle la phase dispersée a un volume de phase inférieur ou égal à 0,75.

2. Composition adoucissante pour tissus selon la revendication 1, ayant une viscosité à 20/s de 200 à 450 mPa.s.

3. Composition adoucissante pour tissus selon la revendication 1 ou 2, dans laquelle la phase dispersée comprend des fragments d'agent adoucissant cationique en phase lamellaire stabilisés par le tensioactif non ionique et liés par l'épaississant associatif.

4. Composition adoucissante pour tissus selon l'une quelconque des revendications précédentes, ayant un volume de phase inférieur ou égal à 0,70.

5. Composition adoucissante pour tissus selon l'une quelconque des revendications précédentes, dans laquelle l'agent adoucissant cationique a un indice d'iode allant de 0 à 20, de manière davantage préférée, de 0 à 2.

6. Composition adoucissante pour tissus selon l'une quelconque des revendications précédentes, dans laquelle le tensioactif non ionique a un HLB de 7 à 20, de manière davantage préférée, de 15 à 20.

7. Composition adoucissante pour tissus selon l'une quelconque des revendications précédentes, dans laquelle le tensioactif non ionique est présent à un niveau supérieur ou égal à 0,35 %, par rapport au poids total de la composition.

8. Composition adoucissante pour tissus selon l'une quelconque des revendications précédentes, dans laquelle l'agent complexant gras est un alcool gras en C_8 à C_{22}.

9. Composition adoucissante pour tissus selon l'une quelconque des revendications précédentes, dans laquelle l'épaississant associatif a une masse moléculaire de 50 000 à 500 000.

10. Composition adoucissante pour tissus selon l'une quelconque des revendications précédentes, dans laquelle l'épaississant associatif est présent à un niveau de 0,001 à 0,5 % en poids de la composition totale.

11. Composition adoucissante pour tissus selon l'une quelconque des revendications précédentes, comprenant un composé d'ammonium quaternaire ayant un seul groupe en C_{12}-C_{28} lié au groupe polaire azote.

12. Composition adoucissante pour tissus selon la revendication 11, dans laquelle le rapport moléculaire de l'agent complexant gras sur le composé d'ammonium quaternaire dont un seul groupe en C_{12}-C_{28} est lié au groupe polaire azote est de 1:3 sur 3:1.

13. Méthode pour le traitement de tissus consistant à mettre en contact des tissus avec une composition liquide adoucissante pour tissus selon l'une quelconque des revendications précédentes.

14. Méthode pour la fabrication d'une composition liquide adoucissante pour tissus selon l'une quelconque des revendications précédentes comprenant les étapes consistant à disperser un agent adoucissant cationique et un tensioactif non ionique dans une phase continue aqueuse, réduire le volume de phase de la phase dispersée et utiliser un épaississant associatif pour épaissir la composition, la phase dispersée étant réduite à un volume de phase inférieur ou égal à 0, 75 et l'agent adoucissant cationique comprenant 5 % ou plus de la composition totale.

15. Méthode selon la revendication 14, dans laquelle le volume de phase est réduit grâce à l'addition d'un électrolyte et/ou au broyage de la formulation.

REFERENCES CITED IN THE DESCRIPTION

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