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(54) **LAUNDRY COMPOSITIONS**

WASCHMITTEL

COMPOSITIONS DE LAVAGE

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Description

FIELD OF THE INVENTION

[0001] This invention relates to a laundry composition. More particularly, the invention is directed to a softening in the wash laundry composition.

BACKGROUND OF THE INVENTION

[0002] Textile fabrics, including clothes, have traditionally been cleaned with laundry detergents. After cleaning, fabrics can often feel harsh. To prevent this, especially harshness experienced after multiple wash cycles, technologies have been developed to increase the softness of fabrics, including rinse-added conditioner compositions and softening systems added to the detergent composition.

[0003] Fabric softening silicones have been used to provide softness to fabrics from a laundry detergent composition. However, there is a problem with formulation stability in terms of unacceptable haze.

SUMMARY OF THE INVENTION

[0004] In a first aspect, the invention is directed to a liquid laundry detergent composition comprising:-

(a) from 5 to 40 wt.% of surfactant;
(b) from 0.05 to 5 wt.% of fabric softening anionic silicone;
(c) from 0.05 to 2.5 wt.% of cationic cellulose polymer having a nitrogen content of from 0.7 to 1.4%;
(d) from 0.001 to 3 wt.% of perfume; and,
(e) from 0.005 to 2 wt.% of fluorescer.

[0005] Preferably the anionic silicone has a molecular weight of from 1,000 to 100,000, more preferably from 2,000 to 50,000 even more preferably from 5,000 to 50,000, most preferably from 10,000 to 50,000.

[0006] Preferably the anionic silicone has an anionic group content of at least 1 mol%, preferably 2 mol%.

[0007] Preferably the anionic silicone comprises a carboxy silicone.

[0008] Preferably the silicone is added to the formulation in the form of an emulsion, more preferably in the form of a nonionic emulsion, most preferably using a branched nonionic emulsifier.

[0009] A preferred level of the anionic silicone is present at a level of from 0.1 to 2.5 wt.%, preferably from 0.1 to 2 wt.%.

[0010] Preferably the liquid detergent composition has a pH of from 6 to 10, more preferably from pH 6.5 to 9.5, most preferably from pH 7 to 9, for example from pH 7.5 to 8.5.

[0011] A preferred level of the cationic polymer is from 0.1 to 2 wt.%, more preferably from 0.1 to 1 wt.%, most preferably from 0.1 to 0.75 wt.%.

[0012] A preferred cationic cellulose polymer is hydroxy ether cellulose that is modified by incorporation of cationic groups (i.e. quaternised hydroxy ethyl cellulose).

[0013] Preferably the weight ratio of the silicone to the cationic polymer is from 5:1 to 1:1.

[0014] Optionally, but preferably, the composition further comprises an ingredient selected from, fatty acids or salts thereof, shading dye, enzyme, an antiredeposition polymer, a dye transfer inhibiting polymer, builder, sequestrant, sunscreen, and/or soil release polymer.

[0015] In a second aspect, the invention provides the use of a composition according to the first aspect of the invention to soften fabrics.

DETAILED DESCRIPTION OF THE INVENTION

[0016] As used herein, the term "comprising" means including, made up of, composed of, consisting and/or consisting essentially of.

[0017] All percentages quoted are wt.% based on total amount in the laundry composition unless otherwise stated.

[0018] The invention is directed to laundry compositions containing surfactant, a cationic cellulose polymer having a specific nitrogen content, a fabric softening anionic silicone, a perfume, and a fluorescer.

Form of the Invention

[0019] The invention can take any of a number of forms that are liquid laundry compositions (such as gels and aqueous liquids). Preferably they are main wash products. It can take the form of a laundry composition for the main wash, which

may be dilutable or non-dilutable. The laundry composition may for example be an isotropic liquid, or a surfactant-structured liquid. Particularly preferred forms of this invention include combination detergent/softener products to provide "softening in the wash".

[0020] Preferably the liquid detergent composition has a pH of from 6 to 10, more preferably from pH 6.5 to 9.5, most preferably from pH 7 to 9, for example from pH 7.5 to 8.5.

Surfactants

[0021] The detergent composition preferably comprises both anionic surfactant and nonionic surfactant.

[0022] Preferably the weight ratio of anionic to nonionic surfactant is from 5:1 to 1:3. More preferably the weight ratio of anionic to nonionic surfactant is from 5:1 to 1:2, even more preferably from 5:1 to 1:1.25, most preferably from 5:1 to 1:1, for example from 4:1 to 1:1.

[0023] The surfactants may be chosen from the surfactants described in "Surface Active Agents" Vol. 1, by Schwartz & Perry, Interscience 1949, Vol. 2 by Schwartz, Perry & Berch, Interscience 1958, in the current edition of "McCutcheon's Emulsifiers and Detergents" published by Manufacturing Confectioners Company or in "Tenside-Taschenbuch", H. Stache, 2nd Edn., Carl Hauser Verlag, 1981. Preferably the surfactants used are saturated.

[0024] Suitable nonionic detergent compounds which may be used include, in particular, the reaction products of compounds having a hydrophobic group and a reactive hydrogen atom, for example, aliphatic alcohols, acids, amides or alkyl phenols with alkylene oxides, especially ethylene oxide either alone or with propylene oxide. Specific nonionic detergent compounds are C_6 to C_{22} alkyl phenol-ethylene oxide condensates, generally 5 to 25 EO, i.e. 5 to 25 units of ethylene oxide per molecule, and the condensation products of aliphatic C_8 to C_{18} primary or secondary linear or branched alcohols with ethylene oxide, generally 5 to 40 EO.

[0025] The alcohol ethoxylates are formed from the reaction of primary or secondary alcohols with ethylene oxide. Typically an aliphatic C_8 to C_{18} primary or secondary linear or branched alcohol is reacted with ethylene oxide in the required molar amount to produce the alcohol ethoxylate. Preferred alcohol ethoxylates have from 2 to 40, preferably from 3 to 30, more preferably from 5 to 20 ethylene oxide units attached to the aliphatic chain.

[0026] Suitable anionic detergent compounds which may be used can be water-soluble alkali metal salts of organic sulphates and sulphonates having alkyl radicals containing from about 8 to about 22 carbon atoms, the term alkyl being used to include the alkyl portion of higher acyl radicals. Examples of suitable synthetic anionic detergent compounds are sodium and potassium alkyl sulphates, especially those obtained by sulphating higher C_8 to C_{18} alcohols, produced for example from tallow or coconut oil, sodium and potassium alkyl C_9 to C_{20} benzene sulphonates, particularly sodium linear secondary alkyl C_{10} to C_{15} benzene sulphonates; and sodium alkyl glyceryl ether sulphates, especially those ethers of the higher alcohols derived from tallow or coconut oil and synthetic alcohols derived from petroleum. The preferred anionic detergent compounds are sodium C_{11} to C_{15} alkyl benzene sulphonates and sodium C_{12} to C_{18} alkyl sulphates. Salts of sulphonates included as hydrotrobes can additionally be considered as anionic surfactants as defined herein. Also applicable are surfactants such as those described in EP-A-328 177 (Unilever), which show resistance to salting-out, the alkyl polyglycoside surfactants described in EP-A-070 074, and alkyl monoglycosides.

[0027] The total amount of surfactant present in the composition is from 5 to 40 wt.%.

[0028] The surfactant level is preferably at least 6 wt.%, more preferably at least 10 wt.%, More preferably the total amount of surfactant is from 12.5 to 40 wt.%, preferably from 15 to 35 wt.%.

[0029] A preferred surfactant system comprises anionic and nonionic surfactant.

[0030] The nonionic detergent is preferably present in amounts of from 2 to 40 wt.%, preferably from 5 to 35 wt.%, more preferably from 6 to 20 wt.%.

[0031] Preferably the nonionic component of the detergent is present from 20 to 75 wt.% more preferably 25 to 60 wt.% of the total surfactant content.

[0032] The nonionic surfactant preferably comprises alcohol ethoxylate.

[0033] A preferred nonionic surfactant is C_{12}-C_{15} alkyl chain with an average of 7 to 9 moles of ethoxylation.

[0034] The anionic surfactant is preferably present in amounts of from 4 to 40 wt.%, preferably from 5 to 35 wt.%, more preferably from 6 to 20 wt.%.

[0035] Preferably the anionic component of the detergent is present from 25 to 80 wt.%, more preferably 40 to 80 wt.%, most preferably from 50 to 80 wt.% of the total surfactant content.

[0036] Preferred anionic surfactants are: linear alkyl benezene sulphonates, sodium lauryl ether sulphonates with 1 to 3 moles (average) of ethoxylation, primary alkyl sulphonates, methyl ether sulphates and secondary alkyl sulphonates or mixtures thereof.

[0037] The anionic surfactant preferably comprises linear alkylbenzene sulfonate.

[0038] For the purposes of interpreting the level of surfactant present in the formulation, fatty acid and their salts are not included in the level of surfactant.

[0039] Other surfactants such as amphoteric, zwitterionic and cationic surfactants may also be present in addition to

the aforementioned nonionic and anionic surfactants.

Fabric Softening Anionic Silicone

[0040] Silicones and their chemistry is described in, for example, The Encyclopedia of Polymer Science, volume 11, p765.

[0041] The composition comprises fabric softening anionic silicone at a level of from 0.05 to 5 wt.%, preferably from 0.1 to 2.5 wt.%, more preferably from 0.1 to 2 wt.%.

[0042] Examples of fabric softening anionic silicone are silicones that incorporate carboxylic, sulphate, sulphonic, phosphate and/or phosphonate functionality.

[0043] Preferred anionic silicones are carboxyl functionalised silicones.

[0044] For the purposes of the invention disclosed herein, the anionic silicone may be in the form of the acid or the anion. For example for the carboxyl functionalised silicone, it may be present as a carboxylic acid or carboxylate anion.

[0045] Examples of commercially available materials are:- X-22-3710, X-22-162C and X-22-3701 E from Shin Etsu; CSi 2342 and Tego polish R20 from Evonik; SFD 209 from Dow Corning; Silube CS-1, CP-1 Silphos J208 from Siltech; Pecosil PS-100, PS112, PS 11220, WDS 100 from Phoenix Chemical; and, Hansa LPF 711 from CHT Beitlich.

[0046] Preferably the anionic silicone has a molecular weight of from 1,000 to 100,000, more preferably from 2,000 to 50,000 even more preferably from 5,000 to 50,000, most preferably from 10,000 to 50,000.

[0047] Preferably the anionic silicone has an anionic group content of at least 1 mol%, preferably 2 mol%.

[0048] Preferably the silicone is added to the formulation in the form of an emulsion, more preferably in the form of a nonionic emulsion. More preferably the emulsion is prepared from nonionic emulsifiers, more preferably branched nonionic emulsifiers for examples Ecosurf EH-3 (Dow Chemical) or Berol 840 (Akzo Nobel).

Cationic Polymer

[0049] The composition comprises a cationic cellulose polymer at a level of from 0.05 to 2.5 wt.%, preferably from 0.1 to 2 wt.%, more preferably from 0.1 to 1 wt.%, most preferably from 0.1 to 0.75 wt.%.

[0050] This term refers to polymers having an overall positive charge.

[0051] The cationic polymer has a nitrogen content of from 0.7 to 1.4%. Preferably the nitrogen content is from 0.75 to 1.2%, more preferably from 0.8 to 1.1 %.

[0052] A preferred cationic cellulose polymers is hydroxy ether cellulose that is modified by incorporation of cationic groups (i.e. quaternised hydroxy ethyl cellulose)

[0053] A preferred class of cationic cellulose polymers suitable for this invention are those that have a cellulosic polysaccharide backbone modified to incorporate a quaternary ammonium salt. Preferably the quaternary ammonium salt is linked to the polysaccharide backbone by a hydroxyethyl or hydroxypropyl group. Preferably the charged nitrogen of the quaternary ammonium salt has one or more alkyl group substituents.

[0054] Cellulose is a polysaccharide with glucose as its monomer, specifically it is a straight chain polymer of D-glucopyranose units linked via β-1,4 glycosidic bonds and is a linear, non-branched polymer.

[0055] Example cationic cellulose polymers are salts of hydroxyethyl cellulose reacted with trimethyl ammonium substituted epoxide, referred to in the field under the International Nomenclature for Cosmetic Ingredients as Polyquatemium 10 and is commercially available from The Dow Chemical Company, marketed as the Polymer LR and JR series of polymers. Other polymers are marketed under the SoftCAT tradename from The Dow Chemical Company. Other suitable types of cationic celluloses include the polymeric quaternary ammonium salts of hydroxyethyl cellulose reacted with lauryl dimethyl ammonium-substituted epoxide referred to in the field under the International Nomenclature for Cosmetic Ingredients as Polyquatemium 24.

[0056] Typical examples of preferred cationic cellulosic polymers include cocodimethylammonium hydroxypropyl oxyethyl cellulose, lauryldimethylammonium hydroxypropyl oxyethyl cellulose, stearyldimethylammonium hydroxypropyl oxyethyl cellulose, and stearyldimethylammonium hydroxyethyl cellulose; cellulose 2-hydroxyethyl 2-hydroxy 3-(trimethyl ammonio) propyl ether salt, polyquaternium-4, polyquaternium-10, polyquaternium-24 and polyquaternium-67 or mixtures thereof.

[0057] More preferably the cationic cellulosic polymer is a quaternised hydroxy ether cellulose cationic polymer. These are commonly known as polyquaternium-10. Suitable commercial cationic cellulosic polymer products for use according to the present invention are marketed by The Dow Chemical Corporation under the trade name UCARE.

[0058] The counterion of the cationic polymer is freely chosen from the halides: chloride, bromide, and iodide; or from hydroxide, phosphate, sulphate, hydrosulphate, ethyl sulphate, methyl sulphate, formate, and acetate.

[0059] Many of the aforementioned cationic cellulose polymers can be synthesised in, and are commercially available in, a number of different molecular weights. Preferably the molecular weight of the cationic polymer is from 10,000 to 2,000,000 Daltons, more preferably from 100,000 to 1,000,000 Daltons, even more preferably from 250,000 to 1,000,000

Daltons.

Perfume

[0060] The perfume is present in the range from 0.001 to 3 wt.%, preferably from 0.1 to 1 wt.%. Many suitable examples of perfumes are provided in the CTFA (Cosmetic, Toiletry and Fragrance Association) 1992 International Buyers Guide, published by CFTA Publications and OPD 1993 Chemicals Buyers Directory 80th Annual Edition, published by Schnell Publishing Co.

[0061] It is commonplace for a plurality of perfume components to be present in a formulation. In the compositions of the present invention it is envisaged that there will be four or more, preferably five or more, more preferably six or more or even seven or more different perfume components.

[0062] In perfume mixtures preferably 15 to 25 wt.% are top notes. Top notes are defined by Poucher (Journal of the Society of Cosmetic Chemists 6(2):80 [1955]). Preferred top-notes are selected from citrus oils, linalool, linalyl acetate, lavender, dihydromyrcenol, rose oxide and cis-3-hexanol.

[0063] It is preferred that the laundry treatment composition does not contain a peroxygen bleach, e.g., sodium percarbonate, sodium perborate, and peracid.

Fluorescent Agent

[0064] The composition preferably comprises a fluorescent agent (optical brightener). Fluorescent agents are well known and many such fluorescent agents are available commercially. Usually, these fluorescent agents are supplied and used in the form of their alkali metal salts, for example, the sodium salts. The total amount of the fluorescent agent or agents used in the composition is from 0.005 to 2 wt.%, preferably 0.01 to 0.1 wt.%. Preferred classes of fluorescer are: Di-styryl biphenyl compounds, e.g. Tinopal (Trade Mark) CBS-X, Di-amine stilbene di-sulphonic acid compounds, e.g. Tinopal DMS pure Xtra and Blankophor (Trade Mark) HRH, and Pyrazoline compounds, e.g. Blankophor SN. Preferred fluorescers are: sodium 2-(4-styryl-3-sulfophenyl)-2H-napthol[1,2-d]trazole, disodium 4,4'-bis{[(4-anilino-6-(N methyl-N-2 hydroxyethyl) amino 1,3,5-triazin-2-yl)]amino}stilbene-2-2' disulfonate, disodium 4,4'-bis{[(4-anilino-6-morpholino-1,3,5-triazin-2-yl)]amino} stilbene-2-2' disulfonate, and disodium 4,4'-bis(2-sulfoslyryl)biphenyl.

Optional Ingredients

[0065] The detergent composition may optionally comprise one or more of the following optional ingredients, fatty acids or salts thereof, shading dye, enzyme, antiredeposition polymer, dye transfer inhibiting polymer, builder, sequestrant, sunscreen and/or soil release polymer.

Builders and sequestrants

[0066] The detergent compositions may also optionally contain relatively low levels of organic detergent builder or sequestrant material. Examples include the alkali metal, citrates, succinates, malonates, carboxymethyl succinates, carboxylates, polycarboxylates and polyacetyl carboxylates. Specific examples include sodium, potassium and lithium salts of oxydisuccinic acid, mellitic acid, benzene polycarboxylic acids, ethylene diamine tetra-acetic acid, diethylene-triaminepentaacetic acid, alkyl- or alkenylsuccinic acid, nitrilotriacetic acid, and citric acid. Other examples are DEQUEST™, organic phosphonate type sequestering agents sold by Thermophos and alkanehydroxy phosphonates.

[0067] Other suitable organic builders include the higher molecular weight polymers and copolymers known to have builder properties. For example, such materials include appropriate polyacrylic acid, polymaleic acid, and polyacrylic/polymaleic acid copolymers and their salts, such as those sold by BASF under the name SOKALAN™. Another suitable builder is sodium carbonate.

[0068] If utilized, the builder materials may comprise from about 0.5% to 20 wt%, preferably from 1 wt% to 10 wt%, of the composition. The preferred builder level is less than 10 wt% and preferably less than 5 wt% of the composition.

[0069] Preferably the laundry detergent formulation is a non-phosphate built laundry detergent formulation, i.e., contains less than 1 wt.% of phosphate.

Shading Dye

[0070] Shading dyes deposit to fabric during the wash or rinse step of the washing process providing a visible hue to the fabric. Shading of white garments may be done with any colour depending on consumer preference. Blue and Violet are particularly preferred shades and consequently preferred dyes or mixtures of dyes are ones that give a blue or violet shade on white fabrics. The shading dyes used are preferably blue or violet.

[0071] The shading dye chromophore is preferably selected from the group comprising: mono-azo, bis-azo, triphenyl-methane, triphenodioxazine, phthalocyanin, naptholactam, azine and anthraquinone. Most preferably mono-azo, bis-azo, azine and anthraquinone.

[0072] Most preferably the dye bears at least one sulfonate group.

[0073] Preferred shading dyes are selected from direct dyes, acid dyes, hydrophobic dyes, cationic dyes and reactive dyes.

[0074] If included, the shading dye is present is present in the composition in range from 0.0001 to 0.01 wt %.

Polymers

[0075] The composition may comprise one or more polymers. Polymers can assist in the cleaning process by helping to retail soil in solution or suspension and/or preventing the transfer of dyes. Polymers can also assist in the soil removal process. Dye transfer, anti-redeposition and soil-release polymers are described in further detail below.

[0076] The composition may comprise one or more polymers. Examples are carboxymethylcellulose, hydroxyethyl cellulose, hydroxpropyl cellulose, poly(ethylene glycol), poly(vinyl alcohol), ethoxylated polyamines, polycarboxylates such as polyacrylates, maleic/acrylic acid copolymers and lauryl methacrylate/acrylic acid copolymers.

Dye transfer inhibitors

[0077] Modern detergent compositions typically employ polymers as so-called 'dye-transfer inhibitors'. These prevent migration of dyes, especially during long soak times. Generally, such dye-transfer inhibiting agents include polyvinyl pyrrolidone polymers, polyamine N-oxide polymers, copolymers of N-vinylpyrrolidone and N-vinylimidazole, manganese pthalocyanine, peroxidases, and mixtures thereof, and are usually present at a level of from 0.01 to 10 wt.% based on total amount in the laundry composition.

Anti-redeposition polymers

[0078] Anti-redeposition polymers are designed to suspend or disperse soil. Typically antiredeposition polymers are ethoxylated and or propoxylated polyethylene imine or polycarboxylate materials, for example, Acrylic acid based homo or copolymers available under the trade mark ACUSOL from Dow Chemical, Alcosperse from Akzonobel or Sokolan from BASF.

Soil Release Polymers

[0079] Examples of suitable soil release polymers include graft copolymers of poly(vinyl ester), e.g., C_1-C_6 vinyl esters, preferably poly(vinyl acetate) grafted onto polyalkylene oxide backbones. Commercially available soil release agents of this kind include the SOKALAN type of material, e.g., SOKALAN HP-22, available from BASF (Germany). Further suitable soil release polymers of a different type include the commercially available material ZELCON 5126 (from DuPont) and MILEASE T (from ICI). If present, the soil release polymer may be included at a level of from from 0.01 to 10 wt.% based on total amount in the laundry composition. Further examples of soil release polymers are terephthalic acid / glycol copolymers sold under the tradenames Texcare, Repel-o-tex, Gerol, Marloquest, Cirrasol.

Hydrotrope

[0080] If in the form of a liquid, then the liquid detergent composition may optionally include a hydrotrope, which can prevent liquid crystal formation. The addition of the hydrotrope thus aids the clarity/transparency of the composition. Suitable hydrotropes include but are not limited to propylene glycol, ethanol, glycerol, urea, salts of benzene sulphonate, toluene sulphonate, xylene sulphonate or cumene sulphonate. Suitable salts include but are not limited to sodium, potassium, ammonium, monoethanolamine, triethanolamine. Salts of sulphonates can also be considered as anionic surfactants as defined herein. Preferably, the hydrotrope is selected from the group consisting of propylene glycol, xylene sulfonate, ethanol, and urea to provide optimum performance. The amount of the hydrotrope is generally in the range of from 0 to 30%, preferably from 0.5 to 30%, more preferably from 0.5 to 30%, most preferably from 1 to 15%.

Enzymes

[0081] Enzymes can also be present in the formulation. Preferred enzymes include protease, lipase, pectate lyase, amylase, cutinase, cellulase, mannanase. If present the enzymes may be stabilized with a known enzyme stabilizer for example boric acid.

Examples

Method of Production of formulation

[0082] Water and hydrotropes are mixed together at ambient temperature (approximately 22°C) for 2-3 minutes at a shear rate of 150 rpm using a Janke & Kunkel IKA RW20 overhead mixer. Salts and alkalis are added and mixed for 5 minutes prior to addition of surfactants and fatty acid. The mixture will exhibit a slight exotherm at this point. After allowing to cool to <30°C, the cationic polymer (LR400 added as an aqueous solution) solution, and any remaining components such as perfume, preservatives, dyes and silicones are added. The silicone was added at 1 wt.% (unless otherwise stated), and was added as an emulsion. Formulations with a number are according to the invention, formulations with a letter are comparative.

Table 1 - Cationic polymers % Nitrogen grade

Cationic Polymer	% Nitrogen
Ucare LK	0.4 - 0.6
Ucare LR400	0.8 - 1.1
Ucare JR400	1.5 - 2.2
Jaguar C500	1.15 - 1.45

Ucare information provided by Dow Chemical; Jaguar C500 - specification sheet

Experiment 1

[0083]

Table 2

Ingredient	A Wt.%	A' Wt.%	B Wt.%	1 Wt.%	C Wt.%	D Wt.%
Monopropylene glycol	15	15	15	15	15	15
TEA	4	4	4	4	4	4
Fluorescer	0.25	0.25	0.25	0.25	0.25	0.25
Citric acid	2	2	2	2	2	2
Neodol 25-7	12	12	12	12	12	12
LAS acid	8	8	8	8	8	8
Fatty acid	3	3	3	3	3	3
SLES	4	4	4	4	4	4
Phosphonate	0.5	0.5	0.5	0.5	0.5	0.5
Anionic Silicone Ex Wacker[1]	1.0	-	1.0	1.0	1.0	1.0
Silicone (PDMS)	-	1.0	-	-	-	-
LK[2]	-	-	0.4	-	-	-
LR400[2]	-	-	-	0.4	-	-
JR400[2]	-	-	-	-	0.4	-
C500[3]	-	-	-	-	-	0.4
Perfume	1.0	1.0	1.0	1.0	1.0	1.0

(continued)

Ingredient	A Wt.%	A' Wt.%	B Wt.%	1 Wt.%	C Wt.%	D Wt.%
Minors; colourants, enzymes, preservative	<5%	<5%	<5%	<5%	<5%	<5%
NaOH	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5
Water	to 100	to 100	to 100	to 100	to 100	to 100
[1]Functional silicone supplied by Wacker with carboxylic functionality [2]Ucare cationic HEC supplied by Dow Chemical [3]Cationic guar supplied by Rhodia						

[0084] PDMS variants of formulations A to D and 1 are not stable (an example is shown as A' in table 2).

Softness Experimental Methodology

[0085] 12 pieces of 20x20cm terry towelling were washed 5 times in a front loading automatic washing machine using the 40°C cotton cycle. Full load was made up to 2kg with a 50/50 blend of cotton and polycotton sheeting. Towels were left to dry naturally between washes.

Softening Results

[0086] Towels were assessed by a trained panel of 12 people who assessed the towel for softness vs. the control sample A. Formulation A was given a score of 100. The softening score is an average of the scores from the 12 panellists.

Table 3

Formulation	Softening Score
A	100
B	103
1	176
C	145
D	142

[0087] Table 3 shows that the best softening score was the combination of the anionic silicone with a cationic cellulose polymer having from 0.7 to 1.4% Nitrogen.

[0088] The softness was then measured using a Stable Micro Systems Texture Analyser (TA) XT plus with the optional friction module attached. The TA is a commercial instrument incorporating a drive mechanism and a 5 kg load cell. The treated fabric was laid on the horizontal test platform of the instrument and a neoprene rubber cylindrical probe which is attached to the load cell was placed on the fabric surface. The texture analyser is programmed to move the probe over a distance of 40 mm forwards and backwards over the fabric at a speed of 10 mm/s. As the probe moves the software records the frictional force experienced by the probe.

[0089] The average friction coefficient over the whole test is used as a measure of softness. The results are shown in table 4.

Table 4

Formulation	Coefficient of friction
B	1.324
1	1.248
C	1.309
D	1.292

[0090] Table 4 shows that the lowest friction (and hence most soft fabric) was the one treated with a formulation comprising the combination of the anionic silicone with a cationic cellulose polymer having from 0.7 to 1.4% Nitrogen. This finding agrees with and further confirms the softness data from the panel tests.

Experiment 2

[0091]

Table 5

Ingredient	E Wt.%	E' Wt.%	F Wt.%	2 Wt.%	G Wt.%	H Wt.%
Monopropylene glycol	15	15	15	15	15	15
TEA	4	4	4	4	4	4
Fluorescer	0.25	0.25	0.25	0.25	0.25	0.25
Citric acid	2	2	2	2	2	2
Neodol 25-7	6	6	6	6	6	6
LAS acid	12	12	12	12	12	12
Fatty acid	3	3	3	3	3	3
SLES	6	6	6	6	6	6
Phosphonate	0.5	0.5	0.5	0.5	0.5	0.5
Anionic Silicone Ex Wacker[1]	1.0	-	1.0	1.0	1.0	1.0
Silicone (PDMS)	-	1.0	-	-	-	-
LK[2]	-	-	0.4	-	-	-
LR400[2]	-	-	-	0.4	-	-
JR400[2]	-	-	-	-	0.4	-
C500[3]	-	-	-	-	-	0.4
Perfume	1.0	1.0	1.0	1.0	1.0	1.0
Minors; colourants, enzymes, preservative	<5%	<5%	<5%	<5%	<5%	<5%
NaOH	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5
Water	to 100	to 100	to 100	to 100	to 100	to 100

[1]Functional silicone supplied by Wacker with carboxylic functionality
[2]Ucare cationic HEC supplied by Dow Chemical
[3]Cationic guar supplied by Rhodia

[0092] PDMS variants of formulations E to H and 2 are not stable (an example is shown as E' in table 5).

Softness Experimental Methodology

Same as for example 1

Softening Results

[0093] Towels were assessed by a trained panel of 12 people who assessed the towel for softness vs. the control sample A. Formulation A was given a score of 100. The softening score is an average of the scores from the 12 panellists.

Table 6

Formulation	Softening Score
E	100
F	146
2	197
G	156
H	125

[0094] Table 6 shows that the best softening score was the combination of the anionic silicone with a cationic cellulose polymer having from 0.7 to 1.4% Nitrogen.

[0095] The softness was then measured using a Stable Micro Systems Texture Analyser (TA) XT plus as for example 1. The results are shown in table 7.

Table 7

Formulation	Coefficient of friction
F	1.292
2	1.239
G	1.304
H	1.267

[0096] Table 7 shows that the lowest friction (and hence most soft fabric) was the one treated with a formulation comprising the combination of the anionic silicone with a cationic cellulose polymer having from 0.7 to 1.4% Nitrogen. This finding agrees with and further confirms the softness data from the panel tests.

Experiment 3

[0097]

Table 8

Ingredient	3 Wt.%	I Wt.%	4 Wt.%	J Wt.%	5 Wt.%	K Wt.%
Monopropylene glycol	12	12	12	12	12	12
Glycerol	5	5	5	5	5	5
TEA	2.5	2.5	2.5	2.5	2.5	2.5
Fluorescer	0.25	0.25	0.25	0.25	0.25	0.25
Citric acid	2	2	2	2	2	2
Neodol 25-7	4.5	4.5	4.5	4.5	4.5	4.5
LAS acid	9	9	9	9	9	9
Fatty acid	3	3	3	3	3	3
SLES	6.5	6.5	6.5	6.5	6.5	6.5
Phosphonate	1.0	1.0	1.0	1.0	1.0	1.0
Ethoxylated polyethylene imine	2	2	2	2	2	2
Anionic Silicone A[1]	1.2	1.2	-	-	-	-
Anionic Silicone B[1]	-	-	1.2	1.2	-	-

(continued)

Ingredient	3 Wt.%	I Wt.%	4 Wt.%	J Wt.%	5 Wt.%	K Wt.%
Anionic Silicone C[2]	-	-	-	-	1.2	1.2
LR400[3]	2.0	-	2.0	-	2.0	-
JR400[3]	-	2.0	-	2.0	-	2.0
Perfume	1.0	1.0	1.0	1.0	1.0	1.0
Minors; colourants, enzymes, preservative	<5%	<5%	<5%	<5%	<5%	<5%
NaOH	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5	to pH 8.0-8.5
Water	to 100	to 100	to 100	to 100	to 100	to 100
[1]Functional silicone supplied by Evonik with carboxylic functionality [2] Functional silicone supplied by Wacker with carboxylic functionality [3] Ucare cationic HEC supplied by Dow Chemical						

Softness Measurement

[0098] 12 pieces of 20x20cm terry towelling were washed 5 times in a front loading automatic washing machine using the 40°C cotton cycle. Full load was made up to 2kg with a 50/50 blend polycotton sheeting. Towels were left to dry naturally between washes.

[0099] The softness was then measured using a Stable Micro Systems Texture Analyser (TA) XT plus as for example 1. The results are shown in table 9.

Table 9

Formulation	Coefficient of friction
3	1.091
I	1.265
4	1.101
J	1.286
5	1.106
K	1.257

[0100] Table 9 shows that the lowest friction scores (and hence most soft fabric) were for those fabrics treated with a formulation comprising the combination of the anionic silicone with a cationic cellulose polymer having from 0.7 to 1.4% Nitrogen.

Claims

1. A liquid laundry detergent composition comprising:-

(a) from 5 to 40 wt.% of surfactant;
(b) from 0.05 to 5 wt.% of fabric softening anionic silicone;
(c) from 0.05 to 2.5 wt.% of cationic cellulose polymer having a nitrogen content of from 0.7 to 1.4%;
(d) from 0.001 to 3 wt.% of perfume; and,
(e) from 0.005 to 2 wt.% of fluorescer.

2. A composition according to claim 1, wherein the anionic silicone has a molecular weight of from 1,000 to 100,000, more preferably from 2,000 to 50,000 even more preferably from 5,000 to 50,000, most preferably from 10,000 to

50,000.

3. A composition according to claim 1 or claim 2, wherein the anionic silicone has an anionic group content of at least 1 mol%, preferably 2 mol%.

4. A composition according to any preceding claim, wherein the anionic silicone is present at a level of from 0.1 to 2.5 wt.%, preferably from 0.1 to 2 wt.%.

5. A composition according to any preceding claim, wherein the anionic silicone comprises a carboxy silicone.

6. A composition according to any preceding claim, wherein the silicone is added to the formulation in the form of an emulsion, preferably in the form of a nonionic emulsion, most preferably using a branched nonionic emulsifier.

7. A composition according to any preceding claim, wherein the liquid detergent composition has a pH of from 6 to 10, more preferably from pH 6.5 to 9.5, most preferably from pH 7 to 9, for example from pH 7.5 to 8.5.

8. A composition according to any preceding claim, wherein the cationic polymer is present at a level of from 0.1 to 2 wt.%, preferably from 0.1 to 1 wt.%, more preferably from 0.1 to 0.75 wt.%.

9. A composition according to any preceding claim, wherein the cationic cellulose polymer, is quaternised hydroxy ethyl cellulose.

10. A composition according to any preceding claim, wherein the weight ratio of the silicone to the cationic polymer is from 5:1 to 1:1.

11. A composition according to any preceding claim, wherein the anionic surfactant comprises one or more from the following group: linear alkyl benezene sulphonates, sodium lauryl ether sulphonates with 1 to 3 average moles of ethoxylation, primary alkyl sulphonates, methyl ether sulphates and secondary alkyl sulphonates or mixtures thereof.

12. A composition according to any preceding claim, wherein the composition further comprises an ingredient selected from, fatty acids or salts thereof, shading dye, enzyme, an antiredeposition polymer, a dye transfer inhibiting polymer, builder, sequestrant, sunscreen, and/or soil release polymer.

13. Use of a composition according to any one of claims 1 to 12 to soften fabrics.

Patentansprüche

1. Flüssige Waschmittelzusammensetzung, die umfasst:

   (a) von 5 bis 40 Gew.-% Tensid,
   (b) von 0,05 bis 5 Gew.-% anionisches Textilweichspüler-Silikon,
   (c) von 0,05 bis 2,5 Gew.-% kationisches Cellulosepolymer mit einem Stickstoffgehalt von 0,7 bis 1,4%,
   (d) von 0,001 bis 3 Gew.-% Duftstoff und
   (e) von 0,005 bis 2 Gew.-% Fluoreszenzmittel.

2. Zusammensetzung nach Anspruch 1, wobei das anionische Silikon ein Molekulargewicht von 1.000 bis 100.000, bevorzugter von 2.000 bis 50.000, sogar bevorzugter von 5.000 bis 50.000, höchst bevorzugt von 10.000 bis 50.000, aufweist.

3. Zusammensetzung nach Anspruch 1 oder Anspruch 2, wobei das anionische Silikon einen Gehalt an anionischer Gruppe von mindestens 1 Mol-%, vorzugsweise 2 Mol-%, aufweist.

4. Zusammensetzung nach irgendeinem vorhergehenden Anspruch, wobei das anionische Silikon in einer Konzentration von 0,1 bis 2,5 Gew.-%, vorzugsweise von 0,1 bis 2 Gew.-%, vorliegt.

5. Zusammensetzung nach irgendeinem vorhergehenden Anspruch, wobei das anionische Silikon Carboxysilikon umfasst.

6. Zusammensetzung nach irgendeinem vorhergehenden Anspruch, wobei das Silikon in Form einer Emulsion, vorzugsweise in Form einer nichtionischen Emulsion, höchst bevorzugt unter Verwendung eines verzweigten nichtionischen Emulgators, zu der Formulierung gegeben wird.

7. Zusammensetzung nach irgendeinem vorhergehenden Anspruch, wobei die flüssige Reinigungsmittelzusammensetzung einen pH von 6 bis 10, bevorzugter einen pH von 6,5 bis 9,5, höchst bevorzugt einen pH von 7 bis 9, zum Beispiel einen pH von 7,5 bis 8,5, aufweist.

8. Zusammensetzung nach irgendeinem vorhergehenden Anspruch, wobei das kationische Polymer in einer Konzentration von 0,1 bis 2 Gew.-%, vorzugsweise von 0,1 bis 1 Gew.-%, bevorzugter von 0,1 bis 0,75 Gew.-%, vorliegt.

9. Zusammensetzung nach irgendeinem vorhergehenden Anspruch, wobei das kationische Cellulosepolymer quaternisierte Hydroxyethylcellulose darstellt.

10. Zusammensetzung nach irgendeinem vorhergehenden Anspruch, wobei das Gewichtsverhältnis des Silikons zum kationischen Polymer von 5:1 bis 1:1 beträgt.

11. Zusammensetzung nach irgendeinem vorhergehenden Anspruch, wobei das anionische Tensid eine oder mehrere der folgenden Gruppen umfasst: lineare Alkylbenzolsulfonate, Natriumlaurylethersulfonate mit durchschnittlich 1 bis 3 Mol Ethoxylierung, primäre Alkylsulfonate, Methylethersulfate und sekundäre Alkylsulfonate oder Mischungen davon.

12. Zusammensetzung nach irgendeinem vorhergehenden Anspruch, wobei die Zusammensetzung des Weiteren einen Bestandteil umfasst, der unter Fettsäuren oder Salzen davon, Nuancierfarbstoff, Enzym, einem Antiredepositionspolymer, einem polymeren Farbstoffübertragungsinhibitor, Builder, Komplexbildner, Sonnenschutzmittel und/oder Schmutzlösepolymer ausgewählt ist.

13. Verwendung einer Zusammensetzung nach irgendeinem der Ansprüche 1 bis 12 zum Weichmachen von Textilien.

Revendications

1. Composition de détergent de lavage liquide comprenant :

   (a) de 5 à 40 % en masse de tensioactif ;
   (b) de 0,05 à 5 % en masse de silicone anionique adoucissant les textiles ;
   (c) de 0,05 à 2,5 % en masse de polymère de cellulose cationique ayant une teneur en azote de 0,7 à 1,4 % ;
   (d) de 0,001 à 3 % en masse de parfum ; et
   (e) de 0,005 à 2 % en masse de fluorescent.

2. Composition selon la revendication 1, dans laquelle le silicone anionique présente une masse moléculaire de 1 000 à 100 000, encore mieux de 2 000 à 50 000, bien mieux encore de 5 000 à 50 000, particulièrement de préférence de 10 000 à 50 000.

3. Composition selon la revendication 1 ou la revendication 2, dans laquelle le silicone anionique présente une teneur en groupe anionique d'au moins 1 % en mol, de préférence 2 % en mol.

4. Composition selon l'une quelconque des revendications précédentes, dans laquelle le silicone anionique est présent à une teneur de 0,1 à 2,5 % en masse, de préférence de 0,1 à 2 % en masse.

5. Composition selon l'une quelconque des revendications précédentes, dans laquelle le silicone anionique comprend un carboxysilicone.

6. Composition selon l'une quelconque des revendications précédentes, dans laquelle le silicone est ajouté à la formulation dans la forme d'une émulsion, de préférence dans la forme d'une émulsion non ionique, encore mieux en utilisant un émulsionnant non ionique ramifié.

7. Composition selon l'une quelconque des revendications précédentes, dans laquelle la composition de détergent

liquide présente un pH de 6 à 10, encore mieux un pH de 6,5 à 9,5, bien mieux encore un pH de 7 à 9, par exemple un pH de 7,5 à 8,5.

8. Composition selon l'une quelconque des revendications précédentes, dans laquelle le polymère cationique est présent à une teneur de 0,1 à 2 % en masse, de préférence de 0,1 à 1 % en masse, encore mieux de 0,1 à 0,75 % en masse.

9. Composition selon l'une quelconque des revendications précédentes, dans laquelle le polymère de cellulose cationique est de l'hydroxyéthylcellulose quaternisé.

10. Composition selon l'une quelconque des revendications précédentes, dans laquelle le rapport massique du silicone au polymère cationique est de 5:1 à 1:1.

11. Composition selon l'une quelconque des revendications précédentes, dans laquelle le tensioactif anionique comprend un ou plusieurs du groupe suivant : des benzènesulfonates d'alkyle linéaire, des sulfonates de sodium lauryléther avec en moyenne de 1 à 3 moles d'éthoxylation, des sulfonates d'alkyle primaire, des sulfates de méthyléther et des sulfonates d'alkyle secondaire ou des mélanges de ceux-ci.

12. Composition selon l'une quelconque des revendications précédentes, dans laquelle la composition comprend de plus un ingrédient choisi parmi des acides gras ou sels de ceux-ci, un colorant nuanceur, une enzyme, un polymère anti-redéposition, un polymère inhibant le transfert de colorant, un structurant, un séquestrant, un écran solaire, et/ou un polymère libérant la saleté.

13. Utilisation d'une composition selon l'une quelconque des revendications 1 à 12 pour assouplir des tissus.

REFERENCES CITED IN THE DESCRIPTION

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