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(54) Title: CLEANING COMPOSITIONS COMPRISING NON-ALKOXYLATED ESTERAMINES

(57) Abstract: Cleaning compositions that include non-alkoxylated esteramines. Related methods of preparation and use.

CLEANING COMPOSITIONS COMPRISING NON-ALKOXYLATED ESTERAMINES

FIELD OF THE INVENTION

The present disclosure relates to cleaning compositions that include non-alkoxylated esteramines. The present disclosure also relates to methods of preparation and use of such compositions.

BACKGROUND OF THE INVENTION

Due to the increasing popularity of easy-care fabrics made of synthetic fibers as well as the increasing energy costs and growing ecological concerns of detergent users, the once popular hot water wash has now taken a back seat to washing fabrics in cold water. Many commercially available laundry detergents are even advertised as being suitable for washing fabrics at 40°C or 30°C or even in cold water. To achieve satisfactory washing result at such low temperatures, i.e. results comparable to those obtained with hot water washes, the demands on low temperature detergents are especially high.

Grease-containing stains, such as makeup and food stains, particularly bacon and butter, are often quite challenging to remove, particularly at lower temperatures. It is known to include certain additives in detergent compositions to enhance the detergent power of conventional surfactants so as to improve the removal of grease stains at temperatures of 60°C and below. Conventional cleaning compositions directed to grease removal frequently utilize various amine compounds which tend to show strong negative impacts on whiteness and/or can be difficult to formulate. As a consequence, there is still a continual need for compounds, particularly amine compounds, that provide grease removal abilities from fabrics and other soiled materials which at the same time do not negatively impact clay cleaning abilities or whiteness. Thus, the search for suitable, effective, and/or improved additives is ongoing.

There is a need for improved cleaning compositions, particularly those that can remove grease stains and/or provide stain removal at low wash temperatures.

SUMMARY OF THE INVENTION

The present disclosure relates to cleaning compositions that include non-alkoxylated esteramines.

For example, the present disclosure relates to cleaning compositions that include: from about 1% to about 70%, by weight of the composition, of a surfactant system; and from about 0.1% to about 10% of a non-alkoxylated esteramine according to Empirical Formula (I) and/or a salt thereof, as described in more detail below.

The present disclosure also relates to cleaning compositions that include: from about 1% to about 70%, by weight of the composition, of a surfactant system; and from about 0.1% to about 10% of a non-alkoxylated esteramine according to Formula (II) and/or a salt thereof, as described in more detail below.

The present disclosure also relates to cleaning compositions that include: from about 1% to about 70%, by weight of the composition, of a surfactant system, and from about 0.1% to about 10% of a non-alkoxylated compound (and/or a salt theref) obtainable by: (a) providing an alcohol of Formula (IV), as described below; and (b) at least partially esterifying the alcohol with at least one acid selected from the group consisting of alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and acids of Formula (V), as described below.

The present disclosure also relates to a method of pretreating or treating a soiled fabric, the method including the step of contacting the soiled fabric with a cleaning composition as described herein, preferably wherein the soiled fabric includes a greasy stain.

The present disclosure also relates to a use of a non-alkoxylated esteramine and/or salt thereof according to the present disclosure in cleaning compositions, preferably laundry compositions, for removal of stains, preferably removal of greasy stains, more preferably the removal of greasy stains in wash water having a temperature of 30°C or less.

DETAILED DESCRIPTION OF THE INVENTION

The present disclosure relates to cleaning compositions, such as laundry detergent compositions, that include non-alkoxylated esteramines. The non-alkoxylated esteramines as

described herein have been found to be surprisingly effective in providing stain removal benefits. In particular, the non-alkoxylated esteramines are effective at removing greasy stains, such as those caused by bacon grease, even at relatively low temperatures.

Without wishing to be bound by theory, it is believed that non-alkoxylated esteramines are able to increase the ability of surfactants to emulsify soil by decreasing the interfacial tension between grease and wash solution thanks to a co-surfactancy mechanism. This improves surfactant packing and, as a consequence, detergent efficiency.

The compositions and methods of the present disclosure are described in more detail below. Features and benefits of the various embodiments of the present invention will become apparent from the following description, which includes examples of specific embodiments intended to give a broad representation of the invention. Various modifications will be apparent to those skilled in the art from this description and from practice of the invention. The scope is not intended to be limited to the particular forms disclosed and the invention covers all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the claims.

As used herein, the articles "a" and "an" when used in a claim, are understood to mean one or more of what is claimed or described. As used herein, the terms "include," "includes," and "including" are meant to be non-limiting. The compositions of the present disclosure can comprise, consist essentially of, or consist of, the components of the present disclosure.

The terms "substantially free of" or "substantially free from" may be used herein. This means that the indicated material is at the very minimum not deliberately added to the composition to form part of it, or, preferably, is not present at analytically detectable levels. It is meant to include compositions whereby the indicated material is present only as an impurity in one of the other materials deliberately included. The indicated material may be present, if at all, at a level of less than 1%, or less than 0.1%, or less than 0.01%, or even 0%, by weight of the composition.

As used herein, the term "soiled material" is used non-specifically and may refer to any type of flexible material consisting of a network of natural or artificial fibers, including natural, artificial, and synthetic fibers, such as, but not limited to, cotton, linen, wool, polyester, nylon, silk, acrylic, and the like, as well as various blends and combinations. Soiled material may further refer to any type of hard surface, including natural, artificial, or synthetic surfaces, such as, but not

limited to, tile, granite, grout, glass, composite, vinyl, hardwood, metal, cooking surfaces, plastic, and the like, as well as blends and combinations.

Generally, as used herein, the term "obtainable by" means that corresponding products do not necessarily have to be produced (i.e. obtained) by the corresponding method or process described in the respective specific context, but also products are comprised which exhibit all features of a product produced (obtained) by said corresponding method or process, wherein said products were actually not produced (obtained) by such method or process. However, the term "obtainable by" also comprises the more limiting term "obtained by", i.e. products which were actually produced (obtained) by a method or process described in the respective specific context.

As used herein the phrase "fabric care composition" includes compositions and formulations designed for treating fabric. Such compositions include but are not limited to, laundry cleaning compositions and detergents, fabric softening compositions, fabric enhancing compositions, fabric freshening compositions, laundry prewash, laundry pretreat, laundry additives, spray products, dry cleaning agent or composition, laundry rinse additive, wash additive, post-rinse fabric treatment, ironing aid, unit dose formulation, delayed delivery formulation, detergent contained on or in a porous substrate or nonwoven sheet, and other suitable forms that may be apparent to one skilled in the art in view of the teachings herein. Such compositions may be used as a pre-laundering treatment, a post-laundering treatment, or may be added during the rinse or wash cycle of the laundering operation.

Unless otherwise noted, all component or composition levels are in reference to the active portion of that component or composition, and are exclusive of impurities, for example, residual solvents or by-products, which may be present in commercially available sources of such components or compositions.

All temperatures herein are in degrees Celsius (°C) unless otherwise indicated. Unless otherwise specified, all measurements herein are conducted at 20°C and under the atmospheric pressure.

In all embodiments of the present disclosure, all percentages are by weight of the total composition, unless specifically stated otherwise. All ratios are weight ratios, unless specifically stated otherwise.

It should be understood that every maximum numerical limitation given throughout this specification includes every lower numerical limitation, as if such lower numerical limitations were expressly written herein. Every minimum numerical limitation given throughout this specification will include every higher numerical limitation, as if such higher numerical limitations were expressly written herein. Every numerical range given throughout this specification will include every narrower numerical range that falls within such broader numerical range, as if such narrower numerical ranges were all expressly written herein.

Cleaning Composition

As used herein the phrase "cleaning composition" includes compositions and formulations designed for cleaning soiled material. Such compositions include but are not limited to, laundry cleaning compositions and detergents, fabric softening compositions, fabric enhancing compositions, fabric freshening compositions, laundry prewash, laundry pretreat, laundry additives, spray products, dry cleaning agent or composition, laundry rinse additive, wash additive, post-rinse fabric treatment, ironing aid, dish washing compositions, hard surface cleaning compositions, unit dose formulation, delayed delivery formulation, detergent contained on or in a porous substrate or nonwoven sheet, and other suitable forms that may be apparent to one skilled in the art in view of the teachings herein. Such compositions may be used as a pre-laundering treatment, a post-laundering treatment, or may be added during the rinse or wash cycle of the laundering operation. The cleaning compositions may have a form selected from liquid, powder, single-phase or multi-phase unit dose article, film, woven web, non-woven web, dissolvable bead or lenticular particle, gel, paste, bar, or flake.

Non-alkoxylated Esteramines

The cleaning compositions described herein include non-alkoxylated esteramines and/or salts thereof. Such compounds may lead to improved cleaning performance of such compositions, for example of liquid laundry detergents, particularly when used in cold water washing conditions. In particular, it has been found that non-alkoxylated esteramines according to the present disclosure surprisingly boost grease cleaning performance of liquid laundry detergents, especially under cold water washing conditions.

The cleaning compositions of the present disclosure may include from about 0.1% to about 20%, or from about 0.2% to about 10%, or from about 0.5% to about 5%, by weight the composition, of a non-alkoxylated esteramine and/or salt thereof.

The non-alkoxylated esteramine may be a compound, and/or salt thereof, according to Empirical Formula I:

$$R^1 - [(CH_2)_c - O(O)C - R^2 - NH_2)_a]_b$$

(Empirical Formula I)

wherein:

R^1 is a C_4-C_{12} alkyl;

each R^2 is independently selected from branched or unbranched C_1-C_{12} substituted alkyl;

each index a is independently selected from an integer from 0 to 4, provided that at least one index value a is non-zero;

the index b is an integer from 1 to 4; and

each index c is independently 0 or 1.

The non-alkoxylated esteramine may be in salt form, for example where one or more NH_2 groups are protonated (e.g., NH_3^+) and the salt includes an A group, where the A group is a suitable charge-balancing counterion. A may be an anion derived from an acid selected from the group consisting methanesulfonic acid, hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid, toluene sulfonic acid, citric acid, lactic acid, C12-C18 fatty acid, alkyl benzene sulfonic acids, alkyl sulphonic acids, alkyl sulfate acids, alkyl ethyoxysulfate acids, alkoxylated or non-alkoxylated copolymers of acrylic acid and maleic acid, and mixtures thereof. A may be an anionic species derived from methanesulfonic acid.

In the non-alkoxylated esteramine according to Empirical Formula I, the R^1 may be a C_6-C_{10} alkyl, more preferably a C_7-C_8 alkyl.

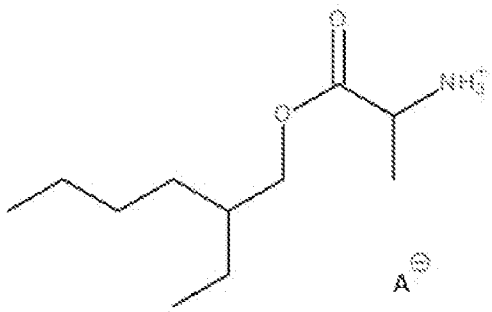
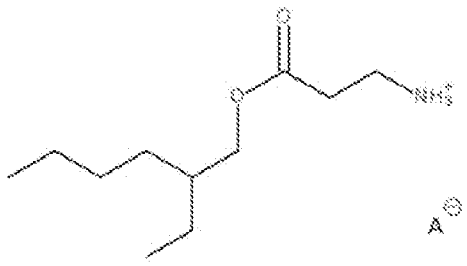
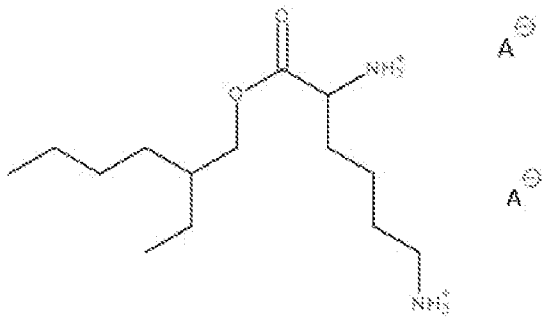
The R^1 may be joined to the b substituent at a non-terminal carbon of R^1. The R^1 may be joined to the b substituent at a 3-carbon position of the R^1.

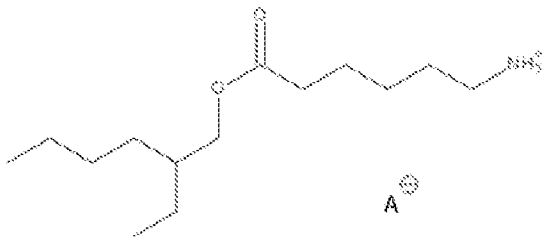
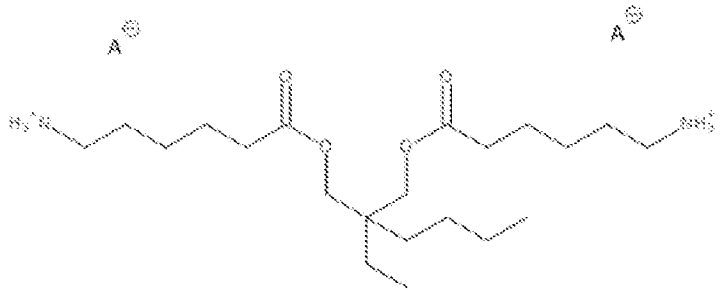
Each R^2 may be independently selected from branched or unbranched C_2-C_8 substituted alkyl, more preferably C_2-C_6 substituted alkyl.

Each index a may be independently selected from an integer from 0 to 3, more preferably 0 to 2, most preferably 1 to 2, provided that at least one index value a is non-zero.

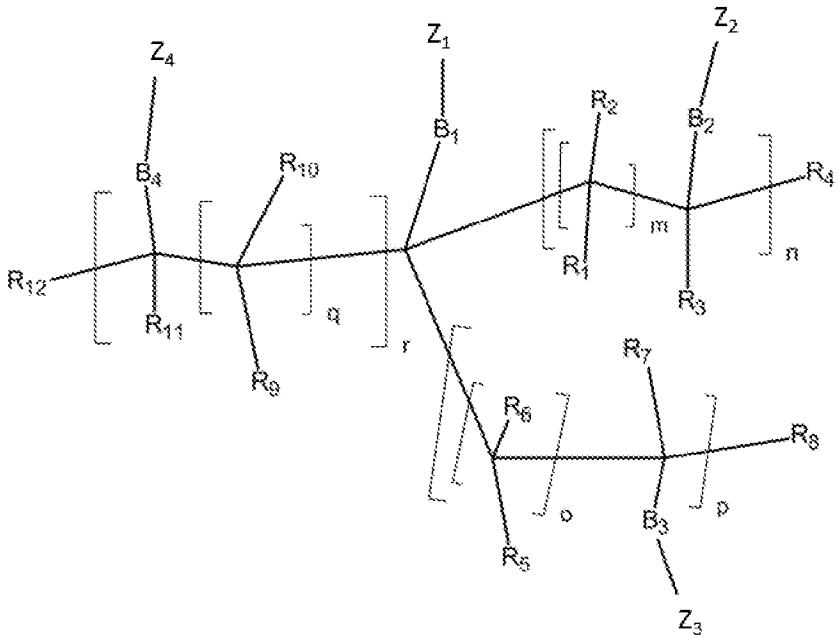
The index b may be an integer from 1 to 3, more preferably 1 to 2, even more preferably 1.

The non-alkoxylated esteramine may be selected from a compound having a structure as shown in the following table, or mixtures thereof, where A is a suitable charge-balancing anion of charge n, as described above. The compounds are shown below in their salt forms, but it is recognized that the esteramines may be present in the compositions of the present disclosure in non-salt form, or in mixtures of salt and non-salt forms.

A	
B	
C	

D	
E	

The non-alkoxylated esteramine may be a compound according to Formula (II) and/or a salt thereof,



(Formula II)

wherein independently from each other

n being an integer from 0 to 12,

m being an integer for each repetition unit n independently selected from 0 to 12;

p being an integer from 0 to 12,

o being an integer for each repetition unit p independently selected from 0 to 12;

r being an integer from 0 to 12,

q being an integer for each repetition unit r independently selected from 0 to 12;

B_1, B_2, B_3, and B_4 are independently from each other selected from the group consisting of a bond, linear C_1 to C_{12} alkanediyl groups, and branched C_1 to C_{12} alkanediyl groups;

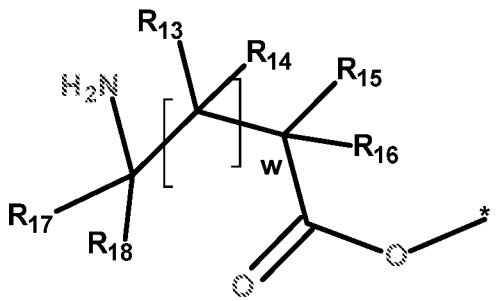
R_4, R_8, and R_{12} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_1, R_2, and R_3 being independently for each repetition unit o of each repetition unit p being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_5, R_6, and R_7 being independently for each repetition unit m of each repetition unit n being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; and

R_9, R_{10}, and R_{11} being independently for each repetition unit q of each repetition unit r being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl,

Z_1, and/or Z_2, and/or Z_3, and/or Z_4, independently for each repetition unit n, p, and r, are selected from the group consisting of OH, alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III),



(Formula III)

wherein said compound according to Formula (III) connects to the compound according to Formula (II) via the bond labeled with *,

with independently from each other

w being an integer from 0 to 12;

R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl,

with the proviso that at least one substituent Z_1, and/or Z_2, and/or Z_3, and/or Z_4, is not OH.

The cleaning compositions of the present disclosure may comprise a non-alkoxylated esteramine according to Formula (II), where n, p, and r are each equal to zero, and Z_1 is selected from the group consisting of alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III), with the proviso of at least one group R_4, R_8, and/or R_{12} containing at least 7 or more carbon atoms; with independently from each other w being an integer from 0 to 12; R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl.

The cleaning compositions of the present disclosure may comprise a non-alkoxylated esteramine according to Formula (II), where p and r are both equal to 0, n is at least 1, and Z_1 and Z_2, are independently selected from the group consisting of OH, alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III), with independently from each other w being an integer from 0 to 12, R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl, R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl, with the proviso that at least one substituent Z_1 and/or Z_2 is not OH, and with the proviso that R_3 contains equal to or more than 2 carbon atoms.

The cleaning compositions of the present disclosure may comprise a non-alkoxylated esteramine according to Formula (II), where n and p are individually equal to or greater than 1, r is equal to or greater than 0, and Z_1, and/or Z_2, and/or Z_3, and/or Z_4, independently for each repetition unit n, p, and r, are selected from the group consisting of OH, alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III), with independently from each other w being an integer from 0 to 12, R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl, and R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl.

The cleaning compositions of the present disclosure may comprise a salt of the esteramine according to Formula (II), wherein the salt is formed by at least partial protonation of the amine group by an acid being a protic organic or inorganic acid. The esteramines of the present invention may be obtained either as free amines, as salts thereof or as a mixture of free amines and salts.

The cleaning compositions of the present disclosure may comprise a salt of the esteramine according to Formula (II), wherein the salt is formed by at least partial protonation of the amine group by an acid being selected from the group consisting methanesulfonic acid, hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid, toluene sulfonic acid, citric acid, lactic acid, C12-C18 fatty acid, alkyl benzene sulfonic acids, alkyl sulphonic acids, alkyl sulfate acids, alkyl ethyoxysulfate acids, alkoxylated or non-alkoxylated copolymers of acrylic acid and maleic acid, and mixtures thereof.

Partial protonation may be protonation of the amine groups in the range of from 1 to 99 mol-% of all amine groups, or in the range of from 10 to 90 mol-% of all amine groups, or in the range of from 25 to 85 mol-%, or in the range of from 40 to 75 mol-% of all amine groups.

The cleaning compositions of the present disclosure may comprise a non-alkoxylated esteramine according to Formula (II), where p, r, and n are all equal to 0, Z_1 is selected from the group consisting of alanine, glycine, lysine, and a compound according to Formula (II), wherein w is an integer in the range of from 1 to 4, and with the proviso of at least one group R_4, R_8, and/or R_{12} containing at least 7 or more carbon atoms.

The cleaning compositions of the present disclosure may comprise a non-alkoxylated esteramine according to Formula (II), where p and r are both equal to 0, and n being at least 1, Z_1

and Z_2, are independently selected from the group consisting of OH, alanine, glycine, lysine, and a compound according to Formula (II), wherein w is an integer in the range of from 1 to 4, with the proviso that at least one substituent Z_1 and/or Z_2 is not OH, and with the proviso that R_3 contains equal to or more than 2 carbon atoms.

The cleaning compositions of the present disclosure may comprise a non-alkoxylated esteramine according to Formula (II), where p and r are both equal to 0, and n being at least 1, wherein m is equal to 1 and R_1 and R_2 are both linear C_2 to C_4 alkyl groups.

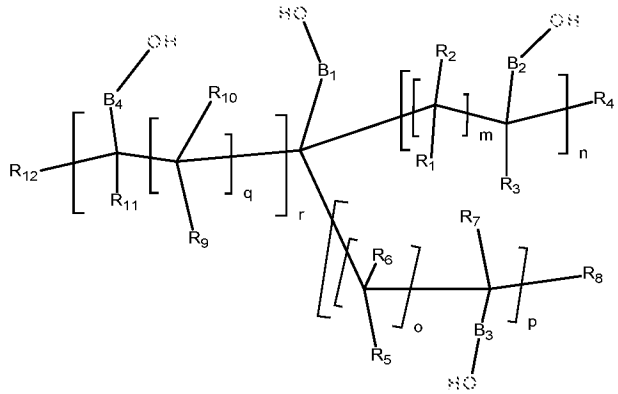
The cleaning compositions of the present disclosure may comprise a non-alkoxylated esteramine according to Formula (II), where when n and p are individually equal to or greater than 1 and r is equal to or greater than 0, Z_1, and/or Z_2, and/or Z_3, and/or Z_4, independently for each repetition unit n, p, and r, are selected from the group consisting of OH, alanine, glycine, lysine, and a compound according to Formula (III), wherein w is an integer in the range of from 1 to 4, with the proviso that at least one substituent Z_1, and/or Z_2, and/or Z_3, and/or Z_4, is not OH.

The cleaning compositions of the present disclosure may comprise a non-alkoxylated esteramine according to Formula (II), where n and p are both equal to 1, r is equal to 0, m and o are both equal to 0, B1 is equal to a chemical bond, R_3, R_4, R_7, R_8, and R_{12} are all equal to H.

The cleaning compositions of the present disclosure may comprise a non-alkoxylated esteramine according to Formula (II), where n and p are both equal to 1, r is equal to 0, m and o are both equal to 0, B1 is equal to a methylene, R_3, R_4, R_7, and R_8 are all equal to H, and R_{12} is equal to ethyl.

Esteramines or salts thereof according to the present disclosure may be prepared by a process comprising the following steps. An alcohol may be provided and esterified, as described in more detail below.

a) Provision of an Alcohol. A non-alkoxylated alcohol of Formula (IV) may be provided:



(Formula IV)

wherein independently from each other

n being an integer from 0 to 12,

m being an integer for each repetition unit n independently selected from 0 to 12;

p being an integer from 0 to 12,

o being an integer for each repetition unit p independently selected from 0 to 12;

r being an integer from 0 to 12,

q being an integer for each repetition unit r independently selected from 0 to 12;

B_1, B_2, B_3, and B_4 are independently from each other selected from the group consisting of a bond, linear C_1 to C_{12} alkanediyl groups, and branched C_1 to C_{12} alkanediyl groups;

R_4, R_8, and R_{12} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_1, R_2, and R_3 being independently for each repetition unit o of each repetition unit p being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_5, R_6, and R_7 being independently for each repetition unit m of each repetition unit n being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

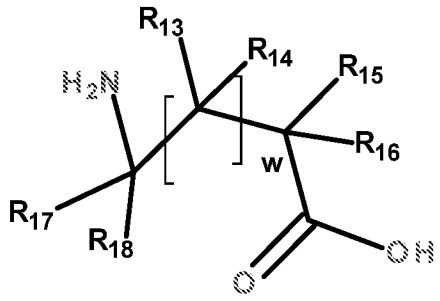
R_9, R_{10}, and R_{11} being independently for each repetition unit q of each repetition unit r being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl.

B_1, B_2, B_3, and B_4 may be independently from each other selected from the group consisting of a bond, and linear C_1 to C_{12} alkanediyl groups. B_1, B_2, B_3, and B_4 may be independently from each other selected from the group consisting of a bond, and linear C_1 to C_6 alkanediyl groups. B_1, B_2, B_3, and B_4 may be independently from each other selected from the group consisting of a bond, and linear C_1 to C_3 alkanediyl groups. B_1, B_2, B_3, and B_4 may be independently from each other selected from the group consisting of a bond, and a C_1 alkanediyl group. B_1, B_2, B_3, and B_4 may be all selected from the group consisting of a bond, and a C_1 alkanediyl group. B_1, B_2, B_3, and B_4 may all be a bond.

R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} may all be independently selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl. R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} may all be independently selected from the group consisting of H, linear C_1 to C_{12} alkyl, and C_1 to C_{12} branched alkyl. R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} may all be independently selected from the group consisting of H, linear C_1 to C_6 alkyl, and C_1 to C_9 branched alkyl.

The non-alkoxylated alcohol may be esterified, as described in more detail below.

b) Esterification. The non-alkoxylated alcohol may be at least partially esterified with at least one acid selected from the group consisting of alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and acids of Formula (V)



(Formula V)

with w being an integer from 0 to 12,

R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl.

The esterification reaction may be performed as known in the art. An inorganic or organic protic acid may be added to the product of step a). The molar ratio of amino acid to hydroxyl groups of the non-alkoxylated alcohol of step a) may be 0.8 : 1 to 1 : 1.5. The process may be carried out with the molar ratio of the acid to the hydroxyl groups of the non-alkoxylated alcohol of step a) being in the range of from 0.1 : 1 to 1: 1. Reaction temperatures may be from 50°C to 200°C, or from 80°C to 160°C. The reaction may be affected by applying vacuum from 1000 mbar to 1 mbar, in another embodiment from 500 mbar to 5 mbar. Reaction times may be from 2 to 48 hours. Suitable solvents for the reaction may be water, toluene, and/or xylene.

The present disclosure also contemplates combinations of at least two (different) esteramines as presented herein. The present disclosure also relates to combinations of the embodiments described above in combination with similar, but alkoxylated, compounds, e.g., alkoxylated esteramines. These compounds may be present in low amounts, e.g., less than about 5% by weight of the total esteramines present in the composition.

Surfactant System

The cleaning compositions comprise a surfactant system in an amount sufficient to provide desired cleaning properties. In some embodiments, the cleaning composition comprises, by weight of the composition, from about 1% to about 70% of a surfactant system. In other embodiments, the liquid cleaning composition comprises, by weight of the composition, from about 2% to about 60% of the surfactant system. In further embodiments, the cleaning composition comprises, by weight of the composition, from about 5% to about 30% of the surfactant system. The surfactant system may comprise a detersive surfactant selected from anionic surfactants, nonionic surfactants, cationic surfactants, zwitterionic surfactants, amphoteric surfactants, ampholytic surfactants, and mixtures thereof. Those of ordinary skill in the art will understand that a detersive surfactant encompasses any surfactant or mixture of surfactants that provide cleaning, stain removing, or laundering benefit to soiled material.

Anionic Surfactant

The compositions of the present disclosure may comprise at least about 10%, or at least about 20%, or at least about 30%, or at least about 50%, or at least about 60%, or at least about

70% by weight of an anionic surfactant. The compositions of the present disclosure may comprise less than 100%, or less than 90%, or less than about 85%, or less than about 75%, or less than about 70% by weight of an anionic surfactant. The compositions of the present disclosure may comprise from about 10% to about 50%, or about 20% to about 70%, or about 30% to about 75%, or about 30% to about 65%, or about 35% to about 65%, or about 40% to about 60%, of an anionic surfactant.

The anionic surfactants may exist in an acid form, and the acid form may be neutralized to form a surfactant salt. Typical agents for neutralization include metal counterion bases, such as hydroxides, e.g., NaOH or KOH. Further suitable agents for neutralizing anionic surfactants in their acid forms include ammonia, amines, or alkanolamines. Non-limiting examples of alkanolamines include monoethanolamine, diethanolamine, triethanolamine, and other linear or branched alkanolamines known in the art; suitable alkanolamines include 2-amino-1-propanol, 1-aminopropanol, monoisopropanolamine, or 1-amino-3-propanol. Amine neutralization may be done to a full or partial extent, e.g., part of the anionic surfactant mix may be neutralized with sodium or potassium and part of the anionic surfactant mix may be neutralized with amines or alkanolamines.

Non-limiting examples of suitable anionic surfactants include any conventional anionic surfactant. This may include a sulfate detersive surfactant, for e.g., alkoxylated and/or non-alkoxylated alkyl sulfate materials, and/or sulfonic detersive surfactants, e.g., alkyl benzene sulfonates. Suitable anionic surfactants may be derived from renewable resources, waste, petroleum, or mixtures thereof. Suitable anionic surfactants may be linear, partially branched, branched, or mixtures thereof

Alkoxylated alkyl sulfate materials comprise ethoxylated alkyl sulfate surfactants, also known as alkyl ether sulfates or alkyl polyethoxylate sulfates. Examples of ethoxylated alkyl sulfates include water-soluble salts, particularly the alkali metal, ammonium and alkylolammonium salts, of organic sulfuric reaction products having in their molecular structure an alkyl group containing from about 8 to about 30 carbon atoms and a sulfonic acid and its salts. (Included in the term "alkyl" is the alkyl portion of acyl groups. In some examples, the alkyl group contains from about 15 carbon atoms to about 30 carbon atoms. In other examples, the alkyl ether sulfate surfactant may be a mixture of alkyl ether sulfates, said mixture having an average (arithmetic mean) carbon chain length within the range of about 12 to 30 carbon atoms, and in some examples an average carbon chain length of about 12 to 15 carbon atoms, and an average

(arithmetic mean) degree of ethoxylation of from about 1 mol to 4 mols of ethylene oxide, and in some examples an average (arithmetic mean) degree of ethoxylation of 1.8 mols of ethylene oxide. In further examples, the alkyl ether sulfate surfactant may have a carbon chain length between about 10 carbon atoms to about 18 carbon atoms, and a degree of ethoxylation of from about 1 to about 6 mols of ethylene oxide. In yet further examples, the alkyl ether sulfate surfactant may contain a peaked ethoxylate distribution.

Non-alkoxylated alkyl sulfates may also be added to the disclosed detergent compositions and used as an anionic surfactant component. Examples of non-alkoxylated, e.g., non-ethoxylated, alkyl sulfate surfactants include those produced by the sulfation of higher C_8-C_{20} fatty alcohols. In some examples, primary alkyl sulfate surfactants have the general formula: $ROSO_3^-$ M^+, wherein R is typically a linear C_8-C_{20} hydrocarbyl group, which may be straight chain or branched chain, and M is a water-solubilizing cation. In some examples, R is a C_{10}-C_{18} alkyl, and M is an alkali metal. In other examples, R is a C_{12}/C_{14} alkyl and M is sodium, such as those derived from natural alcohols.

Other useful anionic surfactants can include the alkali metal salts of alkyl benzene sulfonates, in which the alkyl group contains from about 9 to about 15 carbon atoms, in straight chain (linear) or branched chain configuration. In some examples, the alkyl group is linear. Such linear alkylbenzene sulfonates are known as "LAS." In other examples, the linear alkylbenzene sulfonate may have an average number of carbon atoms in the alkyl group of from about 11 to 14. In a specific example, the linear straight chain alkyl benzene sulfonates may have an average number of carbon atoms in the alkyl group of about 11.8 carbon atoms, which may be abbreviated as C11.8 LAS.

Suitable alkyl benzene sulphonate (LAS) may be obtained, by sulphonating commercially available linear alkyl benzene (LAB); suitable LAB includes low 2-phenyl LAB, such as those supplied by Sasol under the tradename Isochem® or those supplied by Petresa under the tradename Petrelab®, other suitable LAB include high 2-phenyl LAB, such as those supplied by Sasol under the tradename Hyblene®. A suitable anionic detersive surfactant is alkyl benzene sulphonate that is obtained by DETAL catalyzed process, although other synthesis routes, such as HF, may also be suitable. In one aspect a magnesium salt of LAS is used.

Another example of a suitable alkyl benzene sulfonate is a modified LAS (MLAS), which is a positional isomer that contains a branch, e.g., a methyl branch, where the aromatic ring is attached to the 2 or 3 position of the alkyl chain.

The anionic surfactant may include a 2-alkyl branched primary alkyl sulfates have 100% branching at the C2 position (C1 is the carbon atom covalently attached to the alkoxylated sulfate moiety). 2-alkyl branched alkyl sulfates and 2-alkyl branched alkyl alkoxy sulfates are generally derived from 2-alkyl branched alcohols (as hydrophobes). 2-alkyl branched alcohols, e.g., 2-alkyl-1-alkanols or 2-alkyl primary alcohols, which are derived from the oxo process, are commercially available from Sasol, e.g., LIAL®, ISALCHEM® (which is prepared from LIAL® alcohols by a fractionation process). C14/C15 branched primary alkyl sulfate are also commercially available, e.g., namely LIAL® 145 sulfate.

The anionic surfactant may include a mid-chain branched anionic surfactant, e.g., a mid-chain branched anionic detersive surfactant, such as, a mid-chain branched alkyl sulphate and/or a mid-chain branched alkyl benzene sulphonate.

Additional suitable anionic surfactants include methyl ester sulfonates, paraffin sulfonates, α-olefin sulfonates, and internal olefin sulfonates.

The compositions disclosed herein may comprise an anionic surfactant selected from the group consisting of linear or branched alkyl benzene sulfonates, linear or branched alkoxylated alkyl sulfates, linear or branched alkyl sulfates, methyl ester sulfonates, paraffin sulfonates, α-olefin sulfonates, internal olefin sulfonates, and mixtures thereof. The compositions disclosed herein may comprise an anionic surfactant selected from the group consisting of linear or branched alkyl benzene sulfonates, linear or branched alkoxylated alkyl sulfates, linear or branched alkyl sulfates, and mixtures thereof. The compositions disclosed herein may comprise a 2-alkyl branched primary alkyl sulfate.

Nonionic Surfactant

The compositions disclosed herein may comprise a nonionic surfactant. Suitable nonionic surfactants include alkoxylated fatty alcohols. The nonionic surfactant may be selected from ethoxylated alcohols and ethoxylated alkyl phenols of the formula $R(OC_2H_4)_nOH$, wherein R is selected from the group consisting of aliphatic hydrocarbon radicals containing from about 8 to about 15 carbon atoms and alkyl phenyl radicals in which the alkyl groups contain from about 8 to about 12 carbon atoms, and the average value of *n* is from about 5 to about 15.

Other non-limiting examples of nonionic surfactants useful herein include: C_8-C_{18} alkyl ethoxylates, such as, NEODOL® nonionic surfactants from Shell; C_6-C_{12} alkyl phenol alkoxylates

where the alkoxylate units may be ethyleneoxy units, propyleneoxy units, or a mixture thereof; C_{12}-C_{18} alcohol and C_6-C_{12} alkyl phenol condensates with ethylene oxide/propylene oxide block polymers such as Pluronic® from BASF; C_{14}-C_{22} mid-chain branched alcohols, BA; C_{14}-C_{22} mid-chain branched alkyl alkoxylates, BAE_x, wherein x is from 1 to 30; alkylpolysaccharides; specifically alkylpolyglycosides; polyhydroxy fatty acid amides; and ether capped poly(oxyalkylated) alcohol surfactants.

Suitable nonionic detersive surfactants also include alkyl polyglucoside and alkyl alkoxylated alcohol. Suitable nonionic surfactants also include those sold under the tradename Lutensol® from BASF.

Cationic Surfactant

The compositions disclosed herein may comprise a cationic surfactant. Non-limiting examples of cationic surfactants include: the quaternary ammonium surfactants, which can have up to 26 carbon atoms include: alkoxylate quaternary ammonium (AQA) surfactants; dimethyl hydroxyethyl quaternary ammonium; dimethyl hydroxyethyl lauryl ammonium chloride; polyamine cationic surfactants; cationic ester surfactants; and amino surfactants, e.g., amido propyldimethyl amine (APA).

Suitable cationic detersive surfactants also include alkyl pyridinium compounds, alkyl quaternary ammonium compounds, alkyl quaternary phosphonium compounds, alkyl ternary sulphonium compounds, and mixtures thereof.

Suitable cationic detersive surfactants are quaternary ammonium compounds having the general formula:

$(R)(R_1)(R_2)(R_3)N^+ X^-$

wherein, R is a linear or branched, substituted or unsubstituted C_{6-18} alkyl or alkenyl moiety, R_1 and R_2 are independently selected from methyl or ethyl moieties, R_3 is a hydroxyl, hydroxymethyl or a hydroxyethyl moiety, X is an anion which provides charge neutrality, suitable anions include: halides, for example chloride; sulphate; and sulphonate. Suitable cationic detersive surfactants are mono-C_{6-18} alkyl mono-hydroxyethyl di-methyl quaternary ammonium chlorides. Highly suitable cationic detersive surfactants are mono-C_{8-10} alkyl mono-hydroxyethyl di-methyl quaternary ammonium chloride, mono-C_{10-12} alkyl mono-hydroxyethyl

di-methyl quaternary ammonium chloride and mono-C_{10} alkyl mono-hydroxyethyl di-methyl quaternary ammonium chloride.

Zwitterionic Surfactant

The compositions disclosed herein may comprise a zwitterionic surfactant. Examples of zwitterionic surfactants include: derivatives of secondary and tertiary amines, derivatives of heterocyclic secondary and tertiary amines, or derivatives of quaternary ammonium, quaternary phosphonium or tertiary sulfonium compounds. Suitable examples of zwitterionic surfactants include betaines, including alkyl dimethyl betaine and cocodimethyl amidopropyl betaine, C_8 to C_{18} (for example from C_{12} to C_{18}) amine oxides, and sulfo and hydroxy betaines, such as N-alkyl-N,N-dimethylammino-1-propane sulfonate where the alkyl group can be C_8 to C_{18}.

Amphoteric Surfactant

The compositions disclosed herein may comprise an amphoteric surfactant. Examples of amphoteric surfactants include aliphatic derivatives of secondary or tertiary amines, or aliphatic derivatives of heterocyclic secondary and tertiary amines in which the aliphatic radical may be straight or branched-chain and where one of the aliphatic substituents contains at least about 8 carbon atoms, or from about 8 to about 18 carbon atoms, and at least one of the aliphatic substituents contains an anionic water-solubilizing group, e.g. carboxy, sulfonate, sulfate. Suitable amphoteric surfactants also include sarcosinates, glycinates, taurinates, and mixtures thereof.

Adjuncts

The compositions disclosed herein, particularly the dilute and compacted fluid detergents that are suitable for sale to consumers (final products), may comprise adjunct ingredients. The compositions disclosed herein may comprise an adjunct selected from the group consisting of a structurant, a builder, an organic polymeric compound, an enzyme, an enzyme stabilizer, a bleach system, a brightener, a hueing agent, a chelating agent, a suds suppressor, a conditioning agent, a humectant, a perfume, a perfume microcapsule, a filler or carrier, an alkalinity system, a pH control system, a buffer, an alkanolamine, and mixtures thereof.

Enzymes

The compositions described herein may comprise one or more enzymes which provide cleaning performance and/or fabric care benefits. Examples of suitable enzymes include, but are not limited to, hemicellulases, peroxidases, proteases, cellulases, xylanases, lipases, phospholipases, esterases, cutinases, pectinases, mannanases, pectate lyases, keratinases, reductases, oxidases, phenoloxidases, lipoxygenases, ligninases, pullulanases, tannases, pentosanases, malanases, ß-glucanases, arabinosidases, hyaluronidase, chondroitinase, laccase, and amylases, or mixtures thereof. A typical combination is an enzyme cocktail that may comprise, for example, a protease and lipase in conjunction with amylase. When present in a detergent composition, the aforementioned additional enzymes may be present at levels from about 0.00001% to about 2%, from about 0.0001% to about 1% or even from about 0.001% to about 0.5% enzyme protein by weight of the composition. The compositions disclosed herein may comprise from about 0.001% to about 1% by weight of an enzyme (as an adjunct), which may be selected from the group consisting of lipase, amylase, protease, mannanase, cellulase, pectinase, and mixtures thereof.

Enzyme Stabilizing System

The compositions may optionally comprise from about 0.001% to about 10%, or from about 0.005% to about 8%, or from about 0.01% to about 6%, by weight of the composition, of an enzyme stabilizing system. The enzyme stabilizing system can be any stabilizing system which is compatible with the detersive enzyme. Such a system may be inherently provided by other formulation actives, or be added separately, e.g., by the formulator or by a manufacturer of detergent-ready enzymes. Such stabilizing systems can, for example, comprise calcium ion, boric acid, propylene glycol, short chain carboxylic acids, boronic acids, chlorine bleach scavengers and mixtures thereof, and are designed to address different stabilization problems depending on the type and physical form of the detergent composition. In the case of aqueous detergent compositions comprising protease, a reversible protease inhibitor, such as a boron compound, including borate, 4-formyl phenylboronic acid, phenylboronic acid and derivatives thereof, or compounds such as calcium formate, sodium formate and 1,2-propane diol may be added to further improve stability.

Builders

The compositions may comprise a builder. Built compositions typically comprise at least about 1% builder, based on the total weight of the composition. Liquid detergent compositions may comprise up to about 10% builder, and in some examples up to about 8% builder, of the total weight of the composition.

Suitable builders include aluminosilicates (e.g., zeolite builders, such as zeolite A, zeolite P, and zeolite MAP), silicates, phosphates, such as polyphosphates (e.g., sodium tri-polyphosphate), especially sodium salts thereof; carbonates, bicarbonates, sesquicarbonates, and carbonate minerals other than sodium carbonate or sesquicarbonate; organic mono-, di-, tri-, and tetracarboxylates, especially water-soluble nonsurfactant carboxylates in acid, sodium, potassium or alkanolammonium salt form, as well as oligomeric or water-soluble low molecular weight polymer carboxylates including aliphatic and aromatic types; and phytic acid. Additional suitable builders may be selected from citric acid, lactic acid, fatty acid, polycarboxylate builders, for example, copolymers of acrylic acid, copolymers of acrylic acid and maleic acid, and copolymers of acrylic acid and/or maleic acid, and other suitable ethylenic monomers with various types of additional functionalities. Alternatively, the composition may be substantially free of builder.

Structurant / Thickeners

Suitable structurants/thickeners include di-benzylidene polyol acetal derivative. The fluid detergent composition may comprise from about 0.01% to about 1% by weight of a dibenzylidene polyol acetal derivative (DBPA), or from about 0.05% to about 0.8%, or from about 0.1% to about 0.6%, or even from about 0.3% to about 0.5%. The DBPA derivative may comprise a dibenzylidene sorbitol acetal derivative (DBS).

Suitable structurants/thickeners also include bacterial cellulose. The fluid detergent composition may comprise from about 0.005 % to about 1 % by weight of a bacterial cellulose network. The term “bacterial cellulose” encompasses any type of cellulose produced via fermentation of a bacteria of the genus Acetobacter such as CELLULON® by CPKelco U.S. and includes materials referred to popularly as microfibrillated cellulose, reticulated bacterial cellulose, and the like.

Suitable structurants/thickeners also include coated bacterial cellulose. The bacterial cellulose may be at least partially coated with a polymeric thickener. The at least partially coated

bacterial cellulose may comprise from about 0.1 % to about 5 %, or even from about 0.5 % to about 3 %, by weight of bacterial cellulose; and from about 10 % to about 90 % by weight of the polymeric thickener. Suitable bacterial cellulose may include the bacterial cellulose described above and suitable polymeric thickeners include: carboxymethylcellulose, cationic hydroxymethylcellulose, and mixtures thereof.

Suitable structurants/thickeners also include cellulose fibers. The composition may comprise from about 0.01 to about 5% by weight of the composition of a cellulosic fiber. The cellulosic fiber may be extracted from vegetables, fruits or wood. Commercially available examples are Avicel® from FMC, Citri-Fi from Fiberstar or Betafib from Cosun.

Suitable structurants/thickeners also include non-polymeric crystalline hydroxyl-functional materials. The composition may comprise from about 0.01 to about 1% by weight of the composition of a non-polymeric crystalline, hydroxyl functional structurant. The non-polymeric crystalline, hydroxyl functional structurants generally may comprise a crystallizable glyceride which can be pre-emulsified to aid dispersion into the final fluid detergent composition. The crystallizable glycerides may include hydrogenated castor oil or "HCO" or derivatives thereof, provided that it is capable of crystallizing in the liquid detergent composition.

Suitable structurants/thickeners also include polymeric structuring agents. The compositions may comprise from about 0.01 % to about 5 % by weight of a naturally derived and/or synthetic polymeric structurant. Examples of naturally derived polymeric structurants of use in the present invention include: hydroxyethyl cellulose, hydrophobically modified hydroxyethyl cellulose, carboxymethyl cellulose, polysaccharide derivatives and mixtures thereof. Suitable polysaccharide derivatives include: pectine, alginate, arabinogalactan (gum Arabic), carrageenan, gellan gum, xanthan gum, guar gum and mixtures thereof. Examples of synthetic polymeric structurants of use in the present invention include: polycarboxylates, polyacrylates, hydrophobically modified ethoxylated urethanes, hydrophobically modified non-ionic polyols and mixtures thereof.

Suitable structurants/thickeners also include di-amido-gellants. The external structuring system may comprise a di-amido gellant having a molecular weight from about 150 g/mol to about 1,500 g/mol, or even from about 500 g/mol to about 900 g/mol. Such di-amido gellants may comprise at least two nitrogen atoms, wherein at least two of said nitrogen atoms form amido functional substitution groups. The amido groups may be different or the same. Non-limiting examples of di-amido gellants are: N,N'-(2S,2'S)-1,1'-(dodecane-1,12-

diylbis(azanediyl))bis(3-methyl-1-oxobutane-2,1-diyl)diisonicotinamide; dibenzyl (2S,2'S)-1,1'-(propane-1,3-diylbis(azanediyl))bis(3-methyl-1-oxobutane-2,1-diyl)dicarbamate; dibenzyl (2S,2'S)-1,1'-(dodecane-1,12-diylbis(azanediyl))bis(1-oxo-3-phenylpropane-2,1-diyl)dicarbamate.

Polymeric Dispersing Agents

The cleaning composition may comprise one or more polymeric dispersing agents. Examples are carboxymethylcellulose, poly(vinyl-pyrrolidone), poly (ethylene glycol), poly(vinyl alcohol), poly(vinylpyridine-N-oxide), poly(vinylimidazole), polycarboxylates such as polyacrylates, maleic/acrylic acid copolymers and lauryl methacrylate/acrylic acid co-polymers.

The cleaning composition may comprise one or more amphiphilic cleaning polymers such as the compound having the following general structure: bis((C_2H_5O)(C_2H_4O)n)(CH_3)-N^+-C_xH_{2x}-N^+-(CH_3)-bis((C_2H_5O)(C_2H_4O)n), wherein n = from 20 to 30, and x = from 3 to 8, or sulphated or sulphonated variants thereof.

The cleaning composition may comprise amphiphilic alkoxylated grease cleaning polymers which have balanced hydrophilic and hydrophobic properties such that they remove grease particles from fabrics and surfaces. The amphiphilic alkoxylated grease cleaning polymers may comprise a core structure and a plurality of alkoxylate groups attached to that core structure. These may comprise alkoxylated polyalkylenimines, for example, having an inner polyethylene oxide block and an outer polypropylene oxide block. Such compounds may include, but are not limited to, ethoxylated polyethyleneimine, ethoxylated hexamethylene diamine, and sulfated versions thereof. Polypropoxylated derivatives may also be included. A wide variety of amines and polyalklyeneimines can be alkoxylated to various degrees. A useful example is 600g/mol polyethyleneimine core ethoxylated to 20 EO groups per NH and is available from BASF. The detergent compositions described herein may comprise from about 0.1% to about 10%, and in some examples, from about 0.1% to about 8%, and in other examples, from about 0.1% to about 6%, by weight of the detergent composition, of alkoxylated polyamines.

Carboxylate polymer - The detergent composition may also include one or more carboxylate polymers, which may optionally be sulfonated. Suitable carboxylate polymers include a maleate/acrylate random copolymer or a poly(meth)acrylate homopolymer. In one aspect, the carboxylate polymer is a poly(meth)acrylate homopolymer having a molecular weight from 4,000 Da to 9,000 Da, or from 6,000 Da to 9,000 Da.

Alkoxylated polycarboxylates may also be used in the detergent compositions herein to provide grease removal. Such materials are described in WO 91/08281 and PCT 90/01815. Chemically, these materials comprise poly(meth)acrylates having one ethoxy side-chain per every 7-8 (meth)acrylate units. The side-chains are of the formula $-(CH_2CH_2O)_m(CH_2)_nCH_3$ wherein m is 2-3 and n is 6-12. The side-chains are ester-linked to the polyacrylate "backbone" to provide a "comb" polymer type structure. The molecular weight can vary, but may be in the range of about 2000 to about 50,000. The detergent compositions described herein may comprise from about 0.1% to about 10%, and in some examples, from about 0.25% to about 5%, and in other examples, from about 0.3% to about 2%, by weight of the detergent composition, of alkoxylated polycarboxylates.

The compositions may include an amphiphilic graft co-polymer. A suitable amphiphilic graft co-polymer comprises (i) a polyethyelene glycol backbone; and (ii) and at least one pendant moiety selected from polyvinyl acetate, polyvinyl alcohol and mixtures thereof. A suitable amphilic graft co-polymer is Sokalan® HP22, supplied from BASF. Suitable polymers include random graft copolymers, preferably a polyvinyl acetate grafted polyethylene oxide copolymer having a polyethylene oxide backbone and multiple polyvinyl acetate side chains. The molecular weight of the polyethylene oxide backbone is typically about 6000 and the weight ratio of the polyethylene oxide to polyvinyl acetate is about 40 to 60 and no more than 1 grafting point per 50 ethylene oxide units.

Soil release polymer

The detergent compositions of the present invention may also include one or more soil release polymers having a structure as defined by one of the following structures (I), (II) or (III):

(I) $-[(OCHR^1\text{-}CHR^2)_a\text{-}O\text{-}OC\text{-}Ar\text{-}CO\text{-}]_d$

(II) $-[(OCHR^3\text{-}CHR^4)_b\text{-}O\text{-}OC\text{-}sAr\text{-}CO\text{-}]_e$

(III) $-[(OCHR^5\text{-}CHR^6)_c\text{-}OR^7]_f$

wherein:

a, b and c are from 1 to 200;

d, e and f are from 1 to 50;

Ar is a 1,4-substituted phenylene;

sAr is 1,3-substituted phenylene substituted in position 5 with SO_3Me;

Me is Li, K, Mg/2, Ca/2, Al/3, ammonium, mono-, di-, tri-, or tetraalkylammonium wherein the alkyl groups are C_1-C_{18} alkyl or C_2-C_{10} hydroxyalkyl, or mixtures thereof;

R^1, R^2, R^3, R^4, R^5 and R^6 are independently selected from H or C_1-C_{18} n- or iso-alkyl; and

R^7 is a linear or branched C_1-C_{18} alkyl, or a linear or branched C_2-C_{30} alkenyl, or a cycloalkyl group with 5 to 9 carbon atoms, or a C_8-C_{30} aryl group, or a C_6-C_{30} arylalkyl group.

Suitable soil release polymers are polyester soil release polymers such as Repel-o-tex polymers, including Repel-o-tex SF, SF-2 and SRP6 supplied by Rhodia. Other suitable soil release polymers include Texcare polymers, including Texcare SRA100, SRA300, SRN100, SRN170, SRN240, SRN300 and SRN325 supplied by Clariant. Other suitable soil release polymers are Marloquest polymers, such as Marloquest SL supplied by Sasol.

Cellulosic polymer

The cleaning compositions of the present invention may also include one or more cellulosic polymers including those selected from alkyl cellulose, alkyl alkoxyalkyl cellulose, carboxyalkyl cellulose, alkyl carboxyalkyl cellulose. In one aspect, the cellulosic polymers are selected from the group comprising carboxymethyl cellulose, methyl cellulose, methyl hydroxyethyl cellulose, methyl carboxymethyl cellulose, and mixures thereof. In one aspect, the carboxymethyl cellulose has a degree of carboxymethyl substitution from 0.5 to 0.9 and a molecular weight from 100,000 Da to 300,000 Da.*Amines*

Amines may be used in the compositions described herein for added removal of grease and particulates from soiled materials. The compositions described herein may comprise from about 0.1% to about 10%, in some examples, from about 0.1% to about 4%, and in other examples, from about 0.1% to about 2%, by weight of the detergent composition, of additional amines. Non-limiting examples of additional amines may include, but are not limited to, polyetheramines, polyamines, oligoamines, triamines, diamines, pentamines, tetraamines, or combinations thereof. Specific examples of suitable additional amines include tetraethylenepentamine, triethylenetetraamine, diethylenetriamine, or a mixture thereof.

Bleaching Agents

The detergent compositions of the present invention may comprise one or more bleaching agents. Suitable bleaching agents other than bleaching catalysts include photobleaches, bleach activators, hydrogen peroxide, sources of hydrogen peroxide, pre-formed peracids and mixtures thereof. In general, when a bleaching agent is used, the detergent compositions of the present invention may comprise from about 0.1% to about 50% or even from about 0.1% to about 25% bleaching agent by weight of the detergent composition.

Bleach Catalysts

The detergent compositions of the present invention may also include one or more bleach catalysts capable of accepting an oxygen atom from a peroxyacid and/or salt thereof, and transferring the oxygen atom to an oxidizeable substrate. Suitable bleach catalysts include, but are not limited to: iminium cations and polyions; iminium zwitterions; modified amines; modified amine oxides; N-sulphonyl imines; N-phosphonyl imines; N-acyl imines; thiadiazole dioxides; perfluoroimines; cyclic sugar ketones and mixtures thereof.

Brighteners

Optical brighteners or other brightening or whitening agents may be incorporated at levels of from about 0.01% to about 1.2%, by weight of the composition, into the detergent compositions described herein. Commercial fluorescent brighteners suitable for the present invention can be classified into subgroups, including but not limited to: derivatives of stilbene, pyrazoline, coumarin, benzoxazoles, carboxylic acid, methinecyanines, dibenzothiophene-5,5-dioxide, azoles, 5- and 6-membered-ring heterocycles, and other miscellaneous agents.

In some examples, the fluorescent brightener is selected from the group consisting of disodium 4,4'-bis{[4-anilino-6-morpholino-s-triazin-2-yl]-amino}-2,2'-stilbenedisulfonate (brightener 15, commercially available under the tradename Tinopal AMS-GX by Ciba Geigy Corporation), disodium4,4'-bis{[4-anilino-6-(N-2-bis-hydroxyethyl)-s-triazine-2-yl]-amino}-2,2'-stilbenedisulonate (commercially available under the tradename Tinopal UNPA-GX by Ciba-Geigy Corporation), disodium 4,4'-bis{[4-anilino-6-(N-2-hydroxyethyl-N-methylamino)-s-triazine-2-yl]-amino}-2,2'-stilbenedisulfonate (commercially available under the tradename Tinopal 5BM-GX by Ciba-Geigy Corporation). More preferably, the fluorescent brightener is disodium 4,4'-bis{[4-anilino-6-morpholino-s-triazin-2-yl]-amino}-2,2'-stilbenedisulfonate.

The brighteners may be added in particulate form or as a premix with a suitable solvent, for example nonionic surfactant, propanediol.

Fabric Hueing Agents

The composition may comprise a fabric hueing agent (sometimes referred to as shading, bluing or whitening agents). Typically the hueing agent provides a blue or violet shade to fabric. Hueing agents can be used either alone or in combination to create a specific shade of hueing and/or to shade different fabric types. This may be provided for example by mixing a red and green-blue dye to yield a blue or violet shade. Hueing agents may be selected from any known chemical class of dye, including but not limited to acridine, anthraquinone (including polycyclic quinones), azine, azo (e.g., monoazo, disazo, trisazo, tetrakisazo, polyazo), including premetallized azo, benzodifurane and benzodifuranone, carotenoid, coumarin, cyanine, diazahemicyanine, diphenylmethane, formazan, hemicyanine, indigoids, methane, naphthalimides, naphthoquinone, nitro and nitroso, oxazine, phthalocyanine, pyrazoles, stilbene, styryl, triarylmethane, triphenylmethane, xanthenes and mixtures thereof.

Suitable fabric hueing agents include dyes, dye-clay conjugates, and organic and inorganic pigments. Suitable dyes also include small molecule dyes and polymeric dyes. Suitable small molecule dyes include small molecule dyes selected from the group consisting of dyes falling into the Colour Index (C.I.) classifications of Direct, Basic, Reactive or hydrolysed Reactive, Solvent or Disperse dyes for example that are classified as Blue, Violet, Red, Green or Black, and provide the desired shade either alone or in combination. Suitable polymeric dyes include polymeric dyes selected from the group consisting of polymers containing covalently bound (sometimes referred to as conjugated) chromogens, (dye-polymer conjugates), for example polymers with chromogens co-polymerized into the backbone of the polymer and mixtures thereof. Suitable polymeric dyes also include polymeric dyes selected from the group consisting of fabric-substantive colorants sold under the name of Liquitint® (Milliken, Spartanburg, South Carolina, USA), dye-polymer conjugates formed from at least one reactive dye and a polymer selected from the group consisting of polymers comprising a moiety selected from the group consisting of a hydroxyl moiety, a primary amine moiety, a secondary amine moiety, a thiol moiety and mixtures thereof. Suitable polymeric dyes also include polymeric dyes selected from the group consisting of Liquitint® Violet CT, carboxymethyl cellulose (CMC) covalently bound to a reactive blue, reactive violet or reactive red dye such as CMC conjugated with C.I. Reactive Blue 19, sold by Megazyme, Wicklow, Ireland under the product name AZO-CM-CELLULOSE,

product code S-ACMC, alkoxylated triphenyl-methane polymeric colourants, alkoxylated thiophene polymeric colourants, and mixtures thereof.

The aforementioned fabric hueing agents can be used in combination (any mixture of fabric hueing agents can be used).

Encapsulates

The compositions may comprise an encapsulate. The encapsulate may comprise a core, a shell having an inner and outer surface, where the shell encapsulates the core.

The encapsulate may comprise a core and a shell, where the core comprises a material selected from perfumes; brighteners; dyes; insect repellants; silicones; waxes; flavors; vitamins; fabric softening agents; skin care agents, e.g., paraffins; enzymes; anti-bacterial agents; bleaches; sensates; or mixtures thereof; and where the shell comprises a material selected from polyethylenes; polyamides; polyvinylalcohols, optionally containing other co-monomers; polystyrenes; polyisoprenes; polycarbonates; polyesters; polyacrylates; polyolefins; polysaccharides, e.g., alginate and/or chitosan; gelatin; shellac; epoxy resins; vinyl polymers; water insoluble inorganics; silicone; aminoplasts, or mixtures thereof. When the shell comprises an aminoplast, the aminoplast may comprise polyurea, polyurethane, and/or polyureaurethane. The polyurea may comprise polyoxymethyleneurea and/or melamine formaldehyde.

The encapsulate may comprise a core, and the core may comprise a perfume. The encapsulate may comprise a shell, and the shell may comprise melamine formaldehyde and/or cross linked melamine formaldehyde. The encapsulate may comprise a core comprising a perfume and a shell comprising melamine formaldehyde and/or cross linked melamine formaldehyde

Suitable encapsulates may comprise a core material and a shell, where the shell at least partially surrounds the core material. The core of the encapsulate comprises a material selected from a perfume raw material and/or optionally another material, e.g., vegetable oil, esters of vegetable oils, esters, straight or branched chain hydrocarbons, partially hydrogenated terphenyls, dialkyl phthalates, alkyl biphenyls, alkylated naphthalene, petroleum spirits, aromatic solvents, silicone oils, or mixtures thereof.

The wall of the encapsulate may comprise a suitable resin, such as the reaction product of an aldehyde and an amine. Suitable aldehydes include formaldehyde. Suitable amines include

melamine, urea, benzoguanamine, glycoluril, or mixtures thereof. Suitable melamines include methylol melamine, methylated methylol melamine, imino melamine and mixtures thereof. Suitable ureas include, dimethylol urea, methylated dimethylol urea, urea-resorcinol, or mixtures thereof.

Suitable formaldehyde scavengers may be employed with the encapsulates, for example, in a capsule slurry and/or added to a composition before, during, or after the encapsulates are added to such composition.

Suitable capsules can be purchased from Appleton Papers Inc. of Appleton, Wisconsin USA.

Perfumes

Perfumes and perfumery ingredients may be used in the detergent compositions described herein. Non-limiting examples of perfume and perfumery ingredients include, but are not limited to, aldehydes, ketones, esters, and the like. Other examples include various natural extracts and essences which can comprise complex mixtures of ingredients, such as orange oil, lemon oil, rose extract, lavender, musk, patchouli, balsamic essence, sandalwood oil, pine oil, cedar, and the like. Finished perfumes can comprise extremely complex mixtures of such ingredients. Finished perfumes may be included at a concentration ranging from about 0.01% to about 2% by weight of the detergent composition.

Dye Transfer Inhibiting Agents

Fabric detergent compositions may also include one or more materials effective for inhibiting the transfer of dyes from one fabric to another during the cleaning process. Generally, such dye transfer inhibiting agents may include polyvinyl pyrrolidone polymers, polyamine N-oxide polymers, copolymers of N-vinylpyrrolidone and N-vinylimidazole, manganese phthalocyanine, peroxidases, and mixtures thereof. If used, these agents may be used at a concentration of about 0.0001% to about 10%, by weight of the composition, in some examples, from about 0.01% to about 5%, by weight of the composition, and in other examples, from about 0.05% to about 2% by weight of the composition.

Chelating Agents

The detergent compositions described herein may also contain one or more metal ion chelating agents. Suitable molecules include copper, iron and/or manganese chelating agents and mixtures thereof. Such chelating agents can be selected from the group consisting of phosphonates, amino carboxylates, amino phosphonates, succinates, polyfunctionally-substituted aromatic chelating agents, 2-pyridinol-N-oxide compounds, hydroxamic acids, carboxymethyl inulins and mixtures thereof. Chelating agents can be present in the acid or salt form including alkali metal, ammonium, and substituted ammonium salts thereof, and mixtures thereof. Other suitable chelating agents for use herein are the commercial DEQUEST series, and chelants from Monsanto, Akzo-Nobel, DuPont, Dow, the Trilon® series from BASF and Nalco.

The chelant may be present in the detergent compositions disclosed herein at from about 0.005% to about 15% by weight, about 0.01% to about 5% by weight, about 0.1% to about 3.0% by weight, or from about 0.2% to about 0.7% by weight, or from about 0.3% to about 0.6% by weight of the detergent compositions disclosed herein.

Suds Suppressors

Compounds for reducing or suppressing the formation of suds can be incorporated into the detergent compositions described herein. Suds suppression can be of particular importance in the so-called "high concentration cleaning process" and in front-loading style washing machines. The detergent compositions herein may comprise from 0.1% to about 10%, by weight of the composition, of suds suppressor.

Examples of suds supressors include monocarboxylic fatty acid and soluble salts therein, high molecular weight hydrocarbons such as paraffin, fatty acid esters (e.g., fatty acid triglycerides), fatty acid esters of monovalent alcohols, aliphatic C_{18}-C_{40} ketones (e.g., stearone), N-alkylated amino triazines, waxy hydrocarbons preferably having a melting point below about 100 °C, silicone suds suppressors, and secondary alcohols.

Additional suitable antifoams are those derived from phenylpropylmethyl substituted polysiloxanes.

The detergent composition may comprise a suds suppressor selected from organomodified silicone polymers with aryl or alkylaryl substituents combined with silicone resin and a primary filler, which is modified silica. The detergent compositions may comprise from about 0.001% to about 4.0%, by weight of the composition, of such a suds suppressor.

The detergent composition comprises a suds suppressor selected from: a) mixtures of from about 80 to about 92% ethylmethyl, methyl(2-phenylpropyl) siloxane; from about 5 to about 14% MQ resin in octyl stearate; and from about 3 to about 7% modified silica; b) mixtures of from about 78 to about 92% ethylmethyl, methyl(2-phenylpropyl) siloxane; from about 3 to about 10% MQ resin in octyl stearate; from about 4 to about 12% modified silica; or c) mixtures thereof, where the percentages are by weight of the anti-foam.

Suds Boosters

If high sudsing is desired, suds boosters such as the C_{10}-C_{16} alkanolamides may be incorporated into the detergent compositions at a concentration ranging from about 1% to about 10% by weight of the detergent composition. Some examples include the C_{10}-C_{14} monoethanol and diethanol amides. If desired, water-soluble magnesium and/or calcium salts such as $MgCl_2$, $MgSO_4$, $CaCl_2$, $CaSO_4$, and the like, may be added at levels of about 0.1% to about 2% by weight of the detergent composition, to provide additional suds and to enhance grease removal performance.

Conditioning Agents

The composition of the present invention may include a high melting point fatty compound. The high melting point fatty compound useful herein has a melting point of 25°C or higher, and is selected from the group consisting of fatty alcohols, fatty acids, fatty alcohol derivatives, fatty acid derivatives, and mixtures thereof. Such compounds of low melting point are not intended to be included in this section. The high melting point fatty compound is included in the composition at a level of from about 0.1% to about 40%, preferably from about 1% to about 30%, more preferably from about 1.5% to about 16% by weight of the composition, from about 1.5% to about 8%.

The composition of the present invention may include a nonionic polymer as a conditioning agent.

Suitable conditioning agents for use in the composition include those conditioning agents characterized generally as silicones (e.g., silicone oils, cationic silicones, silicone gums, high refractive silicones, and silicone resins), organic conditioning oils (e.g., hydrocarbon oils, polyolefins, and fatty esters) or combinations thereof, or those conditioning agents which otherwise form liquid, dispersed particles in the aqueous surfactant matrix herein. The concentration of the silicone conditioning agent typically ranges from about 0.01% to about 10%.

The compositions of the present invention may also comprise from about 0.05% to about 3% of at least one organic conditioning oil as the conditioning agent, either alone or in combination with other conditioning agents, such as the silicones (described herein). Suitable conditioning oils include hydrocarbon oils, polyolefins, and fatty esters.

Fabric Enhancement Polymers

Suitable fabric enhancement polymers are typically cationically charged and/or have a high molecular weight. Suitable concentrations of this component are in the range from 0.01% to 50%, preferably from 0.1% to 15%, more preferably from 0.2% to 5.0%, and most preferably from 0.5% to 3.0% by weight of the composition. The fabric enhancement polymers may be a homopolymer or be formed from two or more types of monomers. The monomer weight of the polymer will generally be between 5,000 and 10,000,000, typically at least 10,000 and preferably in the range 100,000 to 2,000,000. Preferred fabric enhancement polymers will have cationic charge densities of at least 0.2 meq/gm, preferably at least 0.25 meq/gm, more preferably at least 0.3 meq/gm, but also preferably less than 5 meq/gm, more preferably less than 3 meq/gm, and most preferably less than 2 meq/gm at the pH of intended use of the composition, which pH will generally range from pH 3 to pH 9, preferably between pH 4 and pH 8. The fabric enhancement polymers may be of natural or synthetic origin.

Pearlescent Agent

The laundry detergent compositions of the invention may comprise a pearlescent agent. Non-limiting examples of pearlescent agents include: mica; titanium dioxide coated mica; bismuth oxychloride; fish scales; mono and diesters of alkylene glycol. The pearlescent agent may be ethyleneglycoldistearate (EGDS).

Hygiene and malodour

The compositions of the present invention may also comprise one or more of zinc ricinoleate, thymol, quaternary ammonium salts such as Bardac®, polyethylenimines (such as Lupasol® from BASF) and zinc complexes thereof, silver and silver compounds, especially those designed to slowly release Ag^+ or nano-silver dispersions.

Buffer System

The detergent compositions described herein may be formulated such that, during use in aqueous cleaning operations, the wash water will have a pH of between about 7.0 and about 12, and in some examples, between about 7.0 and about 11. Techniques for controlling pH at recommended usage levels include the use of buffers, alkalis, or acids, and are well known to those skilled in the art. These include, but are not limited to, the use of sodium carbonate, citric acid or sodium citrate, lactic acid or lactate, monoethanol amine or other amines, boric acid or borates, and other pH-adjusting compounds well known in the art.

The detergent compositions herein may comprise dynamic in-wash pH profiles. Such detergent compositions may use wax-covered citric acid particles in conjunction with other pH control agents such that (i) about 3 minutes after contact with water, the pH of the wash liquor is greater than 10; (ii) about 10 minutes after contact with water, the pH of the wash liquor is less than 9.5; (iii) about 20 minutes after contact with water, the pH of the wash liquor is less than 9.0; and (iv) optionally, wherein, the equilibrium pH of the wash liquor is in the range of from about 7.0 to about 8.5.

Water-Soluble Film

The compositions of the present disclosure may be encapsulated within a water-soluble film, for example, a film comprising polyvinyl alcohol (PVOH).

Other Adjunct Ingredients

A wide variety of other ingredients may be used in the detergent compositions herein, including other active ingredients, carriers, hydrotropes, processing aids, dyes or pigments, solvents for liquid formulations, and solid or other liquid fillers, erythrosine, colliodal silica, waxes, probiotics, surfactin, aminocellulosic polymers, Zinc Ricinoleate, perfume microcapsules, rhamnolipids, sophorolipids, glycopeptides, methyl ester sulfonates, methyl ester ethoxylates, sulfonated estolides, cleavable surfactants, biopolymers, silicones, modified silicones, aminosilicones, deposition aids, locust bean gum, cationic hydroxyethylcellulose polymers, cationic guars, hydrotropes (especially cumenesulfonate salts, toluenesulfonate salts, xylenesulfonate salts, and naphalene salts), antioxidants, BHT, PVA particle-encapsulated dyes or perfumes, pearlescent agents, effervescent agents, color change systems, silicone polyurethanes, opacifiers, tablet disintegrants, biomass fillers, fast-dry silicones, glycol distearate, hydroxyethylcellulose polymers, hydrophobically modified cellulose polymers or hydroxyethylcellulose polymers, starch perfume encapsulates, emulsified oils, bisphenol

antioxidants, microfibrous cellulose structurants, properfumes, styrene/acrylate polymers, triazines, soaps, superoxide dismutase, benzophenone protease inhibitors, functionalized TiO2, dibutyl phosphate, silica perfume capsules, and other adjunct ingredients, silicate salts (e.g., sodium silicate, potassium silicate), choline oxidase, pectate lyase, mica, titanium dioxide coated mica, bismuth oxychloride, and other actives.

The compositions described herein may also contain vitamins and amino acids such as: water soluble vitamins and their derivatives, water soluble amino acids and their salts and/or derivatives, water insoluble amino acids viscosity modifiers, dyes, nonvolatile solvents or diluents (water soluble and insoluble), pearlescent aids, foam boosters, additional surfactants or nonionic cosurfactants, pediculocides, pH adjusting agents, perfumes, preservatives, chelants, proteins, skin active agents, sunscreens, UV absorbers, vitamins, niacinamide, caffeine, and minoxidil.

The compositions of the present invention may also contain pigment materials such as nitroso, monoazo, disazo, carotenoid, triphenyl methane, triaryl methane, xanthene, quinoline, oxazine, azine, anthraquinone, indigoid, thionindigoid, quinacridone, phthalocianine, botanical, and natural colors, including water soluble components such as those having C.I. Names. The detergent compositions of the present invention may also contain antimicrobial agents.

Water

The compositions disclosed herein may comprise from about 1% to about 80%, by weight of the composition, water. When the composition is a heavy duty liquid detergent composition, the composition typically comprises from about 40% to about 80% water. When the composition is a compact liquid detergent, the composition typically comprises from about 20% to about 60%, or from about 30% to about 50% water. When the composition is in unit dose form, for example, encapsulated in water-soluble film, the composition typically comprises less than 20%, or less than 15%, or less than 12%, or less than 10%, or less than 8%, or less than 5% water. The composition may comprise from about 1% to 20%, or from about 3% to about 15%, or from about 5% to about 12%, by weight of the composition, water. When the composition is in unitized dose form, for example, encapsulated in water-soluble film, the composition typically comprises less than 20%, or less than 15%, or less than 12%, or less than 10%, or less than 8%, or less than 5% water. The composition may comprise from about 1% to 20%, or from about 3% to about 15%, or from about 5% to about 12%, by weight of the composition, water.

Methods of Use

The present invention includes methods for cleaning soiled material. As will be appreciated by one skilled in the art, the cleaning compositions of the present invention are suited for use in laundry pretreatment applications, laundry cleaning applications, and home care applications.

Such methods include, but are not limited to, the steps of contacting cleaning compositions in neat form or diluted in wash liquor, with at least a portion of a soiled material and then optionally rinsing the soiled material. The soiled material may be subjected to a washing step prior to the optional rinsing step.

For use in laundry pretreatment applications, the method may include contacting the cleaning compositions described herein with soiled fabric. Following pretreatment, the soiled fabric may be laundered in a washing machine or otherwise rinsed.

Machine laundry methods may comprise treating soiled laundry with an aqueous wash solution in a washing machine having dissolved or dispensed therein an effective amount of a machine laundry cleaning composition in accord with the invention. An "effective amount" of the cleaning composition means from about 20g to about 300g of product dissolved or dispersed in a wash solution of volume from about 5L to about 65L. The water temperatures may range from about 5°C to about 100°C. The water to soiled material (e.g., fabric) ratio may be from about 1:1 to about 20:1. In the context of a fabric laundry composition, usage levels may also vary depending not only on the type and severity of the soils and stains, but also on the wash water temperature, the volume of wash water, and the type of washing machine (e.g., top-loading, front-loading, top-loading, vertical-axis Japanese-type automatic washing machine).

The cleaning compositions herein may be used for laundering of fabrics at reduced wash temperatures. These methods of laundering fabric comprise the steps of delivering a laundry cleaning composition to water to form a wash liquor and adding a laundering fabric to said wash liquor, wherein the wash liquor has a temperature of from about 0°C to about 20°C, or from about 0°C to about 15°C, or from about 0°C to about 9°C. The fabric may be contacted to the water prior to, or after, or simultaneous with, contacting the laundry cleaning composition with water.

Another method includes contacting a nonwoven substrate impregnated with an embodiment of the cleaning composition with soiled material. As used herein, "nonwoven substrate" can comprise any conventionally fashioned nonwoven sheet or web having suitable basis weight, caliper (thickness), absorbency, and strength characteristics. Non-limiting examples

of suitable commercially available nonwoven substrates include those marketed under the tradenames SONTARA® by DuPont and POLYWEB® by James River Corp.

Hand washing/soak methods, and combined handwashing with semi-automatic washing machines, are also included.

Hard Surface Cleaning Methods, including Dishwashing Methods

Methods for cleaning hard surfaces, including machine-dishwashing or hand dishwashing soiled dishes, tableware, silverware, or other kitchenware, are included. Hard surfaces may include household hard surfaces, including any kind of surface typically found in and around houses like kitchens, bathrooms, e.g., floors, walls, tiles, windows, cupboards, sinks, showers, shower plastified curtains, wash basins, WCs, fixtures and fittings and the like made of different materials like ceramic, vinyl, no-wax vinyl, linoleum, melamine, glass, Inox®, Formica®, any plastics, plastified wood, metal or any painted or varnished or sealed surface and the like. Household hard surfaces also include household appliances including, but not limited to refrigerators, freezers, washing machines, automatic dryers, ovens, microwave ovens, dishwashers and so on. Such hard surfaces may be found both in private households as well as in commercial, institutional and industrial environments.

A method for machine dishwashing comprises treating soiled dishes, tableware, silverware, or other kitchenware with an aqueous liquid having dissolved or dispensed therein an effective amount of a machine dishwashing composition in accord with the invention. By an effective amount of the machine dishwashing composition it is meant from about 8g to about 60g of product dissolved or dispersed in a wash solution of volume from about 3L to about 10L.

One method for hand dishwashing comprises dissolution of the cleaning composition into a receptacle containing water, followed by contacting soiled dishes, tableware, silverware, or other kitchenware with the dishwashing liquor, then hand scrubbing, wiping, or rinsing the soiled dishes, tableware, silverware, or other kitchenware. Another method for hand dishwashing comprises direct application of the cleaning composition onto soiled dishes, tableware, silverware, or other kitchenware, then hand scrubbing, wiping, or rinsing the soiled dishes, tableware, silverware, or other kitchenware. In some examples, an effective amount of cleaning composition for hand dishwashing is from about 0.5 ml. to about 20 ml. diluted in water.

Packaging for the Compositions

The cleaning compositions described herein can be packaged in any suitable container including those constructed from paper, cardboard, plastic materials, and any suitable laminates. A suitable packaging type is described in European Application No. 94921505.7.

Single- or Multi-Compartment Pouch Additive

The cleaning compositions described herein may also be packaged as a single- or multi-compartment cleaning composition.

COMBINATIONS

Specifically contemplated combinations of the disclosure are herein described in the following lettered paragraphs. These combinations are intended to be illustrative in nature and are not intended to be limiting.

A. A cleaning composition comprising: from about 1% to about 70%, by weight of the composition, of a surfactant system, and from about 0.1% to about 10% of a non-alkoxylated esteramine, and/or a salt thereof, according to Empirical Formula I:

$$R^1 - [(CH_2)_c - O(O)C - R^2 - NH_2)_a]_b$$

(Empirical Formula I)

wherein: R^1 is a C_4-C_{12} alkyl; each R^2 is independently selected from branched or unbranched C_1-C_{12} substituted alkyl; each index a is independently selected from an integer from 0 to 4, provided that at least one index value a is non-zero; the index b is an integer from 1 to 4; each index c is independently 0 or 1.

B. A cleaning composition according to paragraph A, wherein the R^1 is a C_6-C_{10} alkyl, more preferably a C_7-C_8 alkyl.

C. A cleaning composition according to any of paragraphs A-B, wherein the R^1 is joined to the b substituent at a non-terminal carbon of R^1, more preferably wherein R^1 is joined to the b substituent at a 3-carbon position of the R^1.

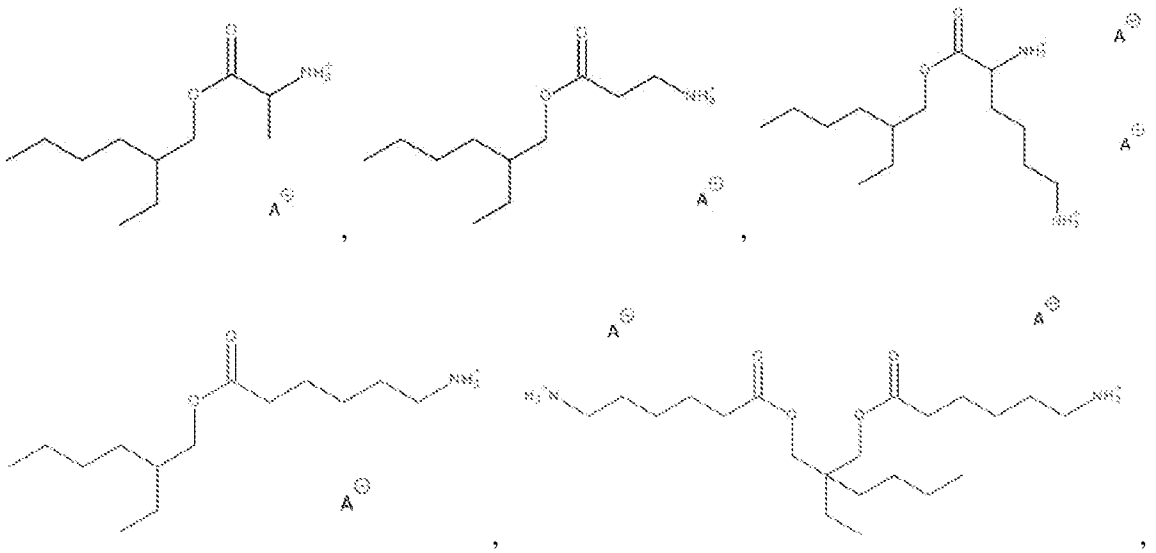
D. A cleaning composition according to any of paragraphs A-C, wherein each R^2 is independently selected from branched or unbranched C_2-C_8 substituted alkyl, more preferably C_2-C_6 substituted alkyl.

E. A cleaning composition according to any of paragraphs A-D, wherein each index a is independently selected from an integer from 0 to 3, more preferably 0 to 2, most preferably 1 to 2, provided that at least one index value a is non-zero.

F. A cleaning composition according to any of paragraphs A-E, wherein the index b is an integer from 1 to 3, more preferably 1 to 2, even more preferably 1.

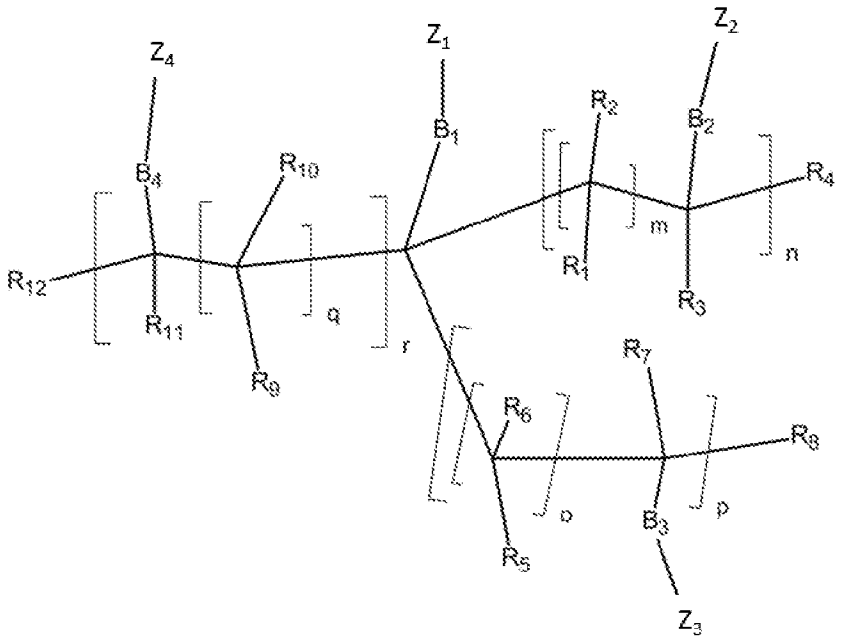
G. A cleaning composition according to any of paragraphs A-F, wherein the non-alkoxylated esteramine is in salt form and coupled with charge-balancing anion A, wherein A is an anion derived from an acid selected from the group consisting methanesulfonic acid, hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid, toluene sulfonic acid, citric acid, lactic acid, C12-C18 fatty acid, alkyl benzene sulfonic acids, alkyl sulphonic acids, alkyl sulfate acids, alkyl ethyoxysulfate acids, alkoxylated or non-alkoxylated copolymers of acrylic acid and maleic acid, and mixtures thereof.

H. A cleaning composition according to any of paragraphs A-G, wherein the non-alkoxylated esteramine is selected from the group consisting of:



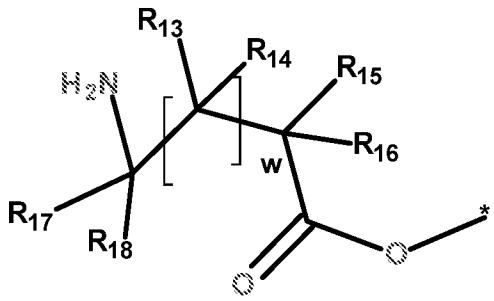
a non-salt form thereof, or a mixture thereof, wherein A is a suitable charge-balancing anion.

I. A cleaning composition comprising: from about 1% to about 70%, by weight of the composition, of a surfactant system, and from about 0.1% to about 10% of a non-alkoxylated esteramine according to Formula (II) and/or a salt thereof,



(Formula II)

wherein independently from each other, n being an integer from 0 to 12; m being an integer for each repetition unit n independently selected from 0 to 12; p being an integer from 0 to 12; o being an integer for each repetition unit p independently selected from 0 to 12; r being an integer from 0 to 12; q being an integer for each repetition unit r independently selected from 0 to 12; B_1, B_2, B_3, and B_4 are independently from each other selected from the group consisting of a bond, linear C_1 to C_{12} alkanediyl groups, and branched C_1 to C_{12} alkanediyl groups; R_4, R_8, and R_{12} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; R_1, R_2, and R_3 being independently for each repetition unit o of each repetition unit p being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; R_5, R_6, and R_7 being independently for each repetition unit m of each repetition unit n being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; and R_9, R_{10}, and R_{11} being independently for each repetition unit q of each repetition unit r being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; Z_1, and/or Z_2, and/or Z_3, and/or Z_4, independently for each repetition unit n, p, and r, are selected from the group consisting of OH, alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III),



(Formula III)

wherein said compound according to Formula (III) connects to the compound according to Formula (II) via the bond labeled with *, with independently from each other, w being an integer from 0 to 12; R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; and R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl,

with the proviso that at least one substituent Z_1, and/or Z_2, and/or Z_3, and/or Z_4, is not OH.

J. A cleaning composition according to paragraph I, wherein n, p, and r are each equal to zero, and Z_1 is selected from the group consisting of alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III), with the proviso of at least one group R_4, R_8, and/or R_{12} containing at least 7 or more carbon atoms; with independently from each other, w being an integer from 0 to 12; R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; and R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl.

K. A cleaning composition according to any of paragraphs I-J, wherein p and r are both equal to 0, n is at least 1, and Z_1 and Z_2, are independently selected from the group consisting of OH, alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III), with independently from each other, w being an integer from 0 to 12; R_{13} and R_{14} independently for each repetition unit w being selected from the

group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl, with the proviso that at least one substituent Z_1 and/or Z_2 is not OH, and with the proviso that R_3 contains equal to or more than 2 carbon atoms.

L. A cleaning composition according to any of paragraphs I-K, wherein n and p are individually equal to or greater than 1, r is equal to or greater than 0, and Z_1, and/or Z_2, and/or Z_3, and/or Z_4, independently for each repetition unit n, p, and r, are selected from the group consisting of OH, alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III), with independently from each other, w being an integer from 0 to 12; R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; and R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl.

M. A cleaning composition according to any of paragraphs I-L, wherein the composition comprises a salt of the esteramine according to Formula (II), wherein the salt is formed by at least partial protonation of the amine group by an acid being a protic organic or inorganic acid.

N. A cleaning composition according to any of paragraphs I-M, wherein the composition comprises a salt of the esteramine according to Formula (II), wherein the salt is formed by at least partial protonation of the amine group by an acid being selected from the group consisting methanesulfonic acid, hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid, toluene sulfonic acid, citric acid, lactic acid, C12-C18 fatty acid, alkyl benzene sulfonic acids, alkyl sulphonic acids, alkyl sulfate acids, alkyl ethyoxysulfate acids, alkoxylated or non-alkoxylated copolymers of acrylic acid and maleic acid, and mixtures thereof.

O. A cleaning composition according to any of paragraphs I-N, wherein p, r, and n are all equal to 0, Z_1 is selected from the group consisting of alanine, glycine, lysine, and a compound according to Formula (II), wherein w is an integer in the range of from 1 to 4, with the proviso of at least one group R_4, R_8, and/or R_{12} containing at least 7 or more carbon atoms.

P. A cleaning composition according to any of paragraphs I-O, wherein p and r are both equal to 0, and n being at least 1, Z_1 and Z_2, are independently selected from the group consisting of OH, alanine, glycine, lysine, and a compound according to Formula (II), wherein w is an integer

in the range of from 1 to 4, with the proviso that at least one substituent Z_1 and/or Z_2 is not OH, and with the proviso that R_3 contains equal to or more than 2 carbon atoms.

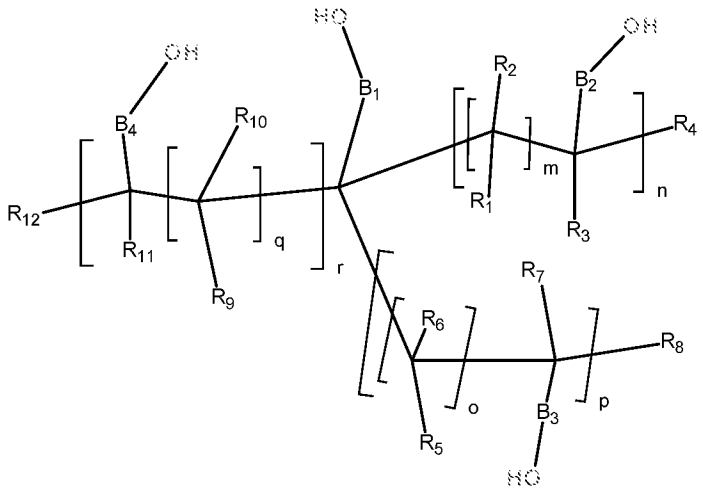
Q. A cleaning composition according to any of paragraphs I-P, wherein p and r are both equal to 0, and n being at least 1, wherein m is equal to 1 and R_1 and R_2 are both linear C_2 to C_4 alkyl groups.

R. A cleaning composition according to any of paragraphs I-Q, wherein when n and p are individually equal to or greater than 1 and r is equal to or greater than 0, Z_1, and/or Z_2, and/or Z_3, and/or Z_4, independently for each repetition unit n, p, and r, are selected from the group consisting of OH, alanine, glycine, lysine, and a compound according to Formula (III), wherein w is an integer in the range of from 1 to 4, with the provisio that at least one substituent Z_1, and/or Z_2, and/or Z_3, and/or Z_4, is not OH.

S. A cleaning composition according to any of paragraphs I-R, wherein n and p are both equal to 1, r is equal to 0, m and o are both equal to 0, B1 is equal to a chemical bond, R_3, R_4, R_7, R_8, and R_{12} are all equal to H.

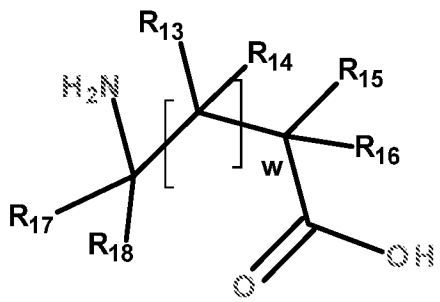
T. A cleaning composition according to any of paragraphs I-S, wherein n and p are both equal to 1, r is equal to 0, m and o are both equal to 0, B1 is equal to a methylene, R_3, R_4, R_7, and R_8 are all equal to H, and R_{12} is equal to ethyl.

U. A cleaning composition comprising comprising: from about 1% to about 70%, by weight of the composition, of a surfactant system, and from about 0.1% to about 10% of a non-alkoxylated compound, and/or salt thereof, obtainable by: (a) providing an alcohol of Formula IV:



(Formula IV)

wherein independently from each other, n being an integer from 0 to 12, m being an integer for each repetition unit n independently selected from 0 to 12; p being an integer from 0 to 12, o being an integer for each repetition unit p independently selected from 0 to 12; r being an integer from 0 to 12, q being an integer for each repetition unit r independently selected from 0 to 12; B_1, B_2, B_3, and B_4 are independently from each other selected from the group consisting of a bond, linear C_1 to C_{12} alkanediyl groups, and branched C_1 to C_{12} alkanediyl groups; R_4, R_8, and R_{12} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; R_1, R_2, and R_3 being independently for each repetition unit o of each repetition unit p being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; R_5, R_6, and R_7 being independently for each repetition unit m of each repetition unit n being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; R_9, R_{10}, and R_{11} being independently for each repetition unit q of each repetition unit r being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; and (b) at least partially esterifying the alcohol with at least one acid selected from the group consisting of alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and acids of Formula (V)



(Formula V)

with w being an integer from 0 to 12, R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl.

V. A cleaning composition according to any of paragraphs A-U, wherein the cleaning composition is a liquid cleaning composition.

W. A cleaning composition according to any of paragraphs A-V, wherein the cleaning composition has a pH of about 7.5 or greater, preferably about 8.0 or greater, in a 10% dilution in deionized water.

X. A cleaning composition according to any of paragraphs A-W, wherein the cleaning composition is a laundry composition.

Y. A cleaning composition according to any of paragraphs A-X, wherein the surfactant system comprises one or more surfactants selected from anionic surfactants, cationic surfactants, non-ionic surfactants, amphoteric surfactants, and mixtures thereof.

Z. A cleaning composition according to any of paragraphs A-Y, wherein the cleaning composition further comprises an adjunct cleaning additive selected from the group consisting of builders, structurants or thickeners, clay soil removal/anti-redeposition agents, polymeric soil release agents, polymeric dispersing agents, polymeric grease cleaning agents, enzymes, enzyme stabilizing systems, bleaching compounds, bleaching agents, bleach activators, bleach catalysts, brighteners, dyes, hueing agents, dye transfer inhibiting agents, chelating agents, suds supressors, softeners, perfumes, and mixtures thereof.

AA. A cleaning composition according to any of paragraphs A-Z, wherein the adjunct cleaning additive comprises enzymes, preferably enzymes selected from protease, amylase, and lipase, more preferably lipase.

BB. A method of pretreating or treating a soiled fabric, the method comprising the step of contacting the soiled fabric with the cleaning composition according to any of paragraphs A-AA, preferably wherein the soiled fabric comprises a greasy stain.

CC. A use of the non-alkoxylated compound according to any of paragraphs A-AA in cleaning compositions, preferably laundry compositions, for removal of stains, preferably removal of greasy stains, more preferably the removal of greasy stains in wash water having a temperature of 30°C or less.

TEST METHODS

General Methods

^{1}H NMR measured in MeOD with Bruker Avance 400 MHz spectrometer.

pH is measured in 10 % aqueous solution.

Hydroxyl values are measured according to DIN 53240-1.

Molecular weight of polyalkylene oxides (e.g. polyethylene glycol) is calculated from the measured hydroxyl values by following formula:

Molecular weight [g/mol] =

1000 / (hydroxyl value [mgKOH/g] / 56.11) x hydroxyl groups per molecule

Method for Stained Swatch Preparation

Make-up stains are supplied by Warwick Equest.

Dyed bacon grease, dyed lard and burnt beef stained knitted cotton swatches are prepared according to the following method using grease supplied by Warwick Equest (Consett, County Durham, UK):

1. The room temperature is maintained at between 20-24°C.

2. A water bath is heated and maintained at 75°C.

3. Desized knitted cotton supplied by Warwick Equest is cut into squares of 5x5cm. The fabrics are laid out onto tissue paper.

4. 8 stained swatches per grease type are prepared; dyed bacon grease, dyed lard and burnt beef for each wash comparison.

5. All dyed bacon grease, dyed lard and burnt beef grease stains for a wash test are prepared as one single batch.

6. Each of dyed bacon grease, dyed lard and burnt beef stored in glass containers is placed in the water bath at 75°C to create a homogenous mixture. The grease remains in the water bath for approximately 1 hour to allow the homogenous grease to reach 75°C.

7. Each of the dyed bacon grease, dyed lard and burnt beef type is carefully pipetted (200µl) onto each of the knitted swatches of 5 x 5cm.

8. Replicates of each grease soil are prepared in batches of 8 for each wash treatment.

9. The grease stain swatches are left to air dry for 60 minutes at room temperature.

10. The grease stain swatches are moved to an oven at 25°C, 60% humidity for a minimum of 24 to 48 hours until use.

Method for Determining Stain Removal Index (SRI)

Standard colorimetric measurement is used to obtain L*, a* and b* values for each stain before and after the washing. From L*, a* and b* values, the stain level is calculated as color difference ΔE (calculated according to DIN EN ISO 11664-4) between stain and untreated fabric.

Stain removal from the swatches is calculated as follows:

$$\textit{Stain Removal Index (SRI)} = \frac{(\Delta E_{initial} - \Delta E_{washed})}{\Delta E_{initial}} X\ 100$$

$\Delta E_{initial}$ = Stain level before washing

ΔE_{washed} = Stain level after washing

Stain level corresponds to the amount of grease on the fabric. The stain level of the fabric before the washing ($\Delta E_{initial}$) is high; in the washing process, stains are removed and the stain level after washing is reduced (ΔE_{washed}). The better a stain has been removed, the lesser the value for ΔE_{washed} and the greater the difference between $\Delta E_{initial}$ and ΔE_{washed} ($\Delta E_{initial} - \Delta E_{washed}$). Therefore, the value of the stain removal index increases with better washing performance.

Stain Removal Index (SRI) is defined as: 0 = no removal at all, 100 = complete removal.

EXAMPLES

The examples provided below are intended to be illustrative in nature and are not intended to be limiting.

Synthesis Examples

Synthesis Example 1. Esteramine 1: 2-ethyl-hexanol, ester with DL-alanine, methane sulfonic acid salt

In a 4-neck vessel with thermometer, reflux condenser, nitrogen inlet, dropping funnel, and stirrer, 97.7 g 2-ethylhexanol and 44.6 g DL-alanine are placed at room temperature. To the mixture 48.1 g methane sulfonic acid is added within 10 minutes. The temperature is allowed to rise to 40 °C during the addition. The reaction mixture is heated to 120°C and is stirred for 4 hours at 120°C. Excess 2-ethylhexanol and volatile compounds are removed in vacuo (1.5 mbar) at elevated temperature (100°C) and 135.0 g of a white solid is obtained. ^{1}H-NMR in MeOD indicates complete conversion to DL-alanine-2-ethylhexylester methane sulfonic acid salt.

Synthesis Example 2. Esteramine 2: 2-ethyl-hexanol, ester with ß-alanine, methane sulfonic acid salt

In a 4-neck vessel with thermometer, reflux condenser, nitrogen inlet, dropping funnel, and stirrer, 65.1 g 2-ethylhexanol and 29.7 g ß-alanine are placed at room temperature. To the mixture 32.7 g methane sulfonic acid is added within 10 minutes. The temperature is allowed to rise to 70 °C during the addition. The reaction mixture is heated to 130°C and is stirred for 4 hours at 130°C. Excess 2-ethylhexanol and volatile compounds are removed in vacuo (1.5 mbar) at elevated temperature (160°C) and 85.0 g of a yellow, viscous oil is obtained. ^{1}H-NMR in MeOD indicates complete conversion to ß-alanine-2-ethylhexylester methane sulfonic acid salt.

Synthesis Example 3. Esteramine 3: 2-ethyl-hexanol, ester with L-lysine, methane sulfonic acid salt

In a 4-neck vessel with thermometer, reflux condenser, nitrogen inlet, dropping funnel, and stirrer, 91.2 g 2-ethylhexanol and 34.1 g L-lysine are placed and heated to 60°C. To the mixture 47.1 g methane sulfonic acid is added within 10 minutes. The temperature is allowed to rise to 90 °C during the addition. The reaction mixture is heated to 125°C and is stirred for 15 hours at 130°C. Excess 2-ethylhexanol and volatile compounds are removed in vacuo (8 mbar) at elevated temperature (90°C) and 90.0 g of a orange-brown viscous oil is obtained. ^{1}H-NMR in MeOD indicates complete conversion to L-lysine-2-ethylhexylester methane sulfonic acid salt.

Synthesis Example 4. Esteramine 4: 2-ethyl-hexanol, ester with 6- amino hexane acid, methane sulfonic acid salt

In a 4-neck vessel with thermometer, reflux condenser, nitrogen inlet, dropping funnel, and stirrer, 65.1 g 2-ethylhexanol and 43.7 g 6-amino hexane acid are placed and heated to 60°C. To the mixture 32.7 g methane sulfonic acid is added within 10 minutes. The temperature is allowed to rise to 85 °C during the addition. The reaction mixture is heated to 130°C and is stirred for 4 hours at 130°C. Excess 2-ethylhexanol and volatile compounds are removed in vacuo (8 mbar) at elevated temperature (130°C) and 109.0 g of a light brown solid is obtained. ^{1}H-NMR in MeOD indicates complete conversion to 6-amino-hexane acid-2-ethylhexylester methane sulfonic acid salt.

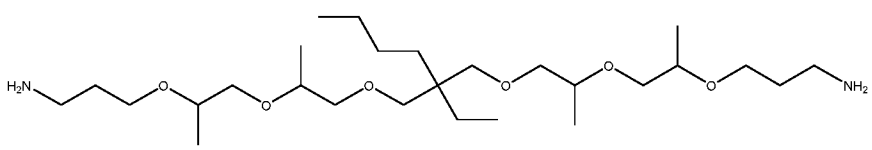
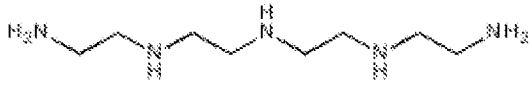
Synthesis Example 5. Esteramine 5: 2-Butyl-2-ethyl-1,3-propane diol, ester with 6-amino hexane acid

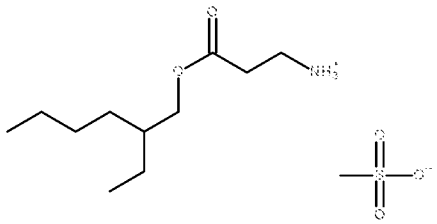
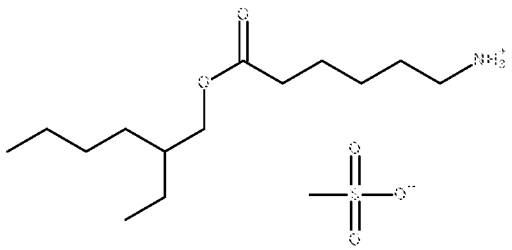
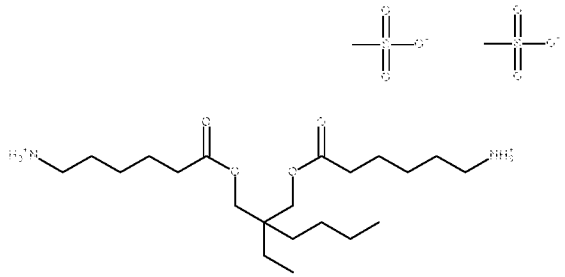
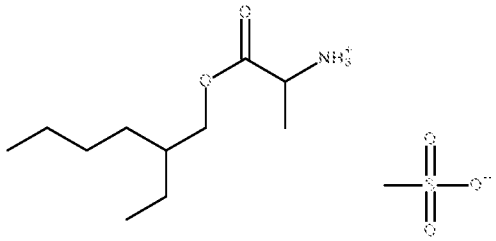
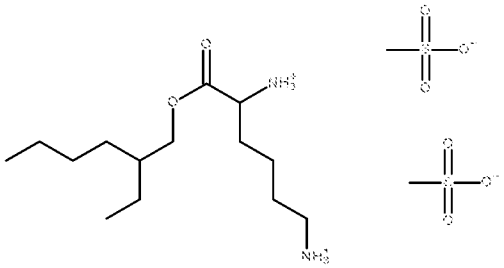
In a 4-neck vessel with thermometer, reflux condenser, nitrogen inlet, dropping funnel, and stirrer 32.1 g 2-Butyl-2-ethyl-1,3-propane diol and 52.5 g 6-amino hexane acid are placed. The mixture is heated to 60°C, and 39.2 g methane sulfonic acid is added within 10 minutes. The temperature is allowed to rise to 85 °C during the addition. The reaction mixture is heated to 130°C and is stirred for 4 hours at 130°C. Volatile compounds are removed in vacuo and 115.0 g of a yellow, viscous oil is obtained. ^{1}H-NMR in MeOD indicates 75 % conversion of diol to a mixture of mono- and di-esterified diol.

Performance Examples

Table 1 provides a key for the amine compounds that are tested in the following examples.

Table 1.

Amine Description	Amine Structure
None	--
Polyetheramine 1 (12-butyl-12-ethyl-5,8,16,19-tetramethyl-4,7,10,14,17,20-hexaoxatricosane-1,23-diamine)	
Tetraethylene-pentamine (TEPA)	
Esteramine 1	

	
Esteramine 2	
Esteramine 3	
Esteramine 4	
Esteramine 5	

Performance Example 1. Stain Removal Benefits (food grease) in European wash conditions

Formulations

Eight laundry detergent compositions (A-H) are prepared by traditional means known to those of ordinary skill in the art by mixing the listed ingredients. The general formula of the

detergent compositions is shown in Table 2, and the added amine (if any) for each is shown in Table 3.

Table 2. General detergent composition

Ingredients of liquid detergent composition	**percentage by weight**
n-C10-C13-alkylbenzene sulfonic acid	10.15
coconut C12-C18 fatty acid	2.59
sodium laureth sulfate + 2 EO	1.23
C14-15-oxo alcohol + 7 EO	4.10
C12C14-oxo alcohol + 7 EO	2.02
Zwitterionic ethoxylated quaternized sulfated hexamethylene diamine	0.63
Sokalan 101 Polyethyleneglycol-Polyvinylacetate copolymer dispersant	1.07
Enzymes, chelant, ionic strength,	3.63
Solvents: 1-2 Propane diol, Ethanol, Sorbitol, Sodium Cumene Sulfonate	2.73
Salts: calcium chloride, sodium formate, sodium chloride	0.066
Neutralising agents; sulphuric acid, MEA, sodium hydroxide	0.42
Preservatives, perfumes, dyes, suds suppressor, structuring agent, brightener	0.30
Amine	***[see Table 2]***
Water pH of detergent composition = 8.2	balance

Table 3. Added amine

Example	**Amine**	**percentage by weight**
A	*None*	--
B	Polyetheramine 1	2.0
C	TEPA	2.0
D	Esteramine 1, salt form	2.0
E	Esteramine 2, salt form	2.0
F	Esteramine 3, salt form	2.0
G	Esteramine 4, salt form	2.0
H	Esteramine 5, salt form	2.0

Test Wash Procedure

The wash method involves the use of a Tergotometer to simulate the washing of fabrics in a washing machine. Each test formulation A-E are used to wash the grease stain swatches together with SBL 2004 soiled fabric cut in to 5cm x 5cm swatches (10 of the 5cm x 5cm swatches were used per wash pot, SBL 2004 is supplied by WFK Testgewebe GmbH, Bruggen, Germany, product code 10996) and clean knitted cotton ballast of 5 x 5 cm (35g). Each wash treatment consists of two replicates of each of the chosen grease stained knitted cotton swatches. This is repeated 3 more times to result in a 2 internal and 4 external replicate test design, to equal 8 replicates of each of the grease stain swatches per wash treatment.

Each Tergotometer pot containing 1L of the test wash solution made of 4.19g of each detergent composition (as described in Tables 2 and 3) and using 8gpg water (Ca2+ :Mg2+ molar ratio 3:1), 2 replicates of each of the grease stain swatches and ballast at 30°C, agitated at ~200rpm for 30 minutes. After the wash, the grease stain swatches and ballast were spun at 1000rpm for 2 minutes then rinsed in 15°C water (Ca2+ :Mg2+ molar ratio 3:1) for 5 minutes before a final spin of 2 minutes at 1000rpm. The grease stain swatches were laid flat on a drying tray and air dried overnight and then analysed for grease removal performance.

Test Results

The cleaning performance on the grease and makeup stain swatches from each detergent wash treatment was compared via the measure of stain removal index. Stain Removal Index (SRI) is defined as: 0 = no removal at all, 100 = complete removal.

The following amines were tested for greasy stain removal. Trials A1-C1 are comparative trials, while trials D1-H1 include non-alkoxylated esteramines according to the present disclosure. Table 4 shows the stain removal results.

Table 4.

Trial	Amine	Bacon Grease SRI	Lard SRI	Burnt Beef SRI	SD
A1 (comp.)	*None*	57	53	59	2.0
B1 (comp.)	Poly-etheramine 1	76	71	72	1.5
C1 (comp.)	TEPA	76	70	72	1.5

D1	Esteramine 1	84	78	79	0.9
E1	Esteramine 2	83	76	77	1.5
F1	Esteramine 3	74	66	68	1.3
G1	Esteramine 4	81	75	77	1.5
H1	Esteramine 5	75	63	76	2.5

As shown in Table 3, a wash test performed to compare compositions D1-H1 containing esteramines according to the present disclosure (i.e., Esteramines 1-5) provide improved grease cleaning benefits compared to compositions A1, having no amine present, and are overall equal to better on grease stain removal performance to compositions B1 and C1 that include Polyetheramine 1 and TEPA, each of which are known to give strong grease cleaning benefits.

Performance Example 2. Stain Removal Benefits (make-up) in European wash conditions

Formulations

Formulations A, B, D, and E, as described in Performance Example 1, are prepared and tested.

Test Wash Procedure

In Performance Example 2, swatches having make-up stains are tested.

The wash method involves the use of a Miele washing machine model 1714, using a short cotton wash cycle at 30ºC, 54.5g of detergent per wash and using 8gpg water (Ca2+ :Mg2+ molar ratio 3:1). Each test formulation A-D are used to wash the grease stain swatches together with SBL 2004 soiled fabric sheets (4) supplied by WFK Testgewebe GmbH, Bruggen, Germany, product code 10996) and clean mixed cotton ballast of 3kg. Each wash treatment consists of two replicates of each of the chosen grease stained knitted cotton swatches attached onto a cotton backing fabric. This is repeated 3 more times to result in a 2 internal and 4 external replicate test design, to equal 8 replicates of each of the grease stain swatches per wash treatment.

The grease stain swatches are laid flat on a drying tray and air dried overnight and are then analysed for grease removal performance.

Test Results

Compositions having the following amines are tested for greasy stain removal. Trials A2 and B2 are comparative trials, while trials D2 and E2 include non-alkoxylated esteramines according to the present disclosure. Table 5 shows the stain removal results.

Table 5.

Trial	Amine	Make-up	SD
A2 (comp.)	*None*	41	4.4
B2 (comp.)	Polyetheramine 1	57	4.4
D2	Esteramine 1	70	4.4
E2	Esteramine 2	69	4.4

As shown in Table 4, a wash test performed to compare compositions D2 and E2 containing esteramines according to the present disclosure (i.e., Esteramines 1 and 2) especially provide improved grease cleaning on make-up compared to compositions A2, having no amine, and B2 that includes Polyetheramine 1, which is known to give strong grease cleaning.

Performance Example 3. Stain Removal Benefits (food grease) in dilute North American wash conditions.

Formulations

The following laundry detergent compositions are prepared by traditional means known to those of ordinary skill in the art by mixing the listed ingredients.

Table 6. Detergents I-L

Liquid Detergent	I (wt%)	J (wt%)	K (wt%)	L (wt %)
AES C_{12-15} alkyl ethoxy (1.8) sulfate	11.77	11.77	11.77	11.77
Alkyl benzene sulfonate [2]	7.25	7.25	7.25	7.25
C12-14 Amine Oxide	0.70	0.70	0.70	0.70
Calcium formate, sodium formate, sodium chloride	0.21	0.21	0.21	0.21
Neutralisers: Sodium hydroxide, sulphuric acid, monoethanolamine,	2.3	2.3	2.3	2.3
Solvents: Propylene glycol, Diethylene Glycol, Ethanol	7.16	7.16	7.16	7.16
C45AE7	6.80	6.80	6.80	6.80

C24 AE9	0.47	0.47	0.47	0.47
Citric Acid	2.11	2.11	2.11	2.11
C_{12-18} Fatty Acid	0.93	0.93	0.93	0.93
Borax	1.01	1.01	1.01	1.01
Ethoxylated Polyethyleneimine	1.51	1.51	1.51	1.51
Amphiphilic alkoxylated grease cleaning polymer	1.39	1.39	1.39	1.39
Polyether amine	0.0	2.0	0.0	0.0
Esteramine 1, salt form	0.0	0.0	2.0	0.0
Esteramine 2, salt form	0.0	0.0	0.0	2.0
Water, dyes, enzymes, chelant, hydrotrope, perfumes, brightener, misc. pH balance to 8.2	balance			

Test Wash Procedure

The wash method involves the use of a Tergotometer to simulate the washing of fabrics in a washing machine. Each test formulation A, B, D and E are used to wash the grease stain swatches together with SBL 2004 soiled fabric cut in to 5cm x 5cm swatches (10 of the 5cm x 5cm swatches were used per wash pot, SBL 2004 is supplied by WFK Testgewebe GmbH, Bruggen, Germany, product code 10996) and clean knitted cotton ballast of 5 x 5 cm (50g). Each wash treatment consists of two replicates of each of the chosen grease stained knitted cotton swatches. This is repeated 3 more times to result in a 2 internal and 4 external replicate test design, to equal 8 replicates of each of the grease stain swatches per wash treatment.

Each Tergotometer pot containing 1L of the test wash solution made of 1.2g of each detergent composition (as described in table 1) and using 7gpg water (Ca2+ :Mg2+ molar ratio 3:1), 2 replicates of each of the grease stain swatches and ballast at 25°C, agitated at 1250rpm for 12 minutes. After the wash, the grease stain swatches and ballast were spun at 1000rpm for 2 minutes then rinsed in 15°C water (Ca2+ :Mg2+ molar ratio 3:1) for 7 minutes before a final spin of 2 minutes at 1000rpm. The grease stain swatches were laid flat on a drying tray and air dried overnight and then analysed for grease removal performance.

Test Results

The cleaning performance of the grease stain swatches from each detergent wash treatment was compared via the measure of stain removal index. Stain Removal Index (SRI) is defined as: 0 = no removal at all, 100 = complete removal.

The following amines were tested for greasy stain removal. Trials I1-J1 are comparative trials, while trials K1-L1 include non-alkoxylated esteramines according to the present disclosure. Table 7 shows the stain removal results.

Table 7.

Trial	Amine	Bacon Grease SRI	Lard SRI	Burnt Beef SRI*	SD
I1 (comp.)	*None*	26	15	30	2.3
J1 (comp.)	Poly-etheramine 1	35	17	25	2.0
K1	Esteramine 1	42	21	29	3.1
L1	Esteramine 2	44	29	27	2.3

** The burnt beef stain in this test gave low quality results, believed to be due to visible spreading across the fabrics for all treatments. A benefit was visibly clear when comparing legs K1 and L1 containing amine versus comparative reference I1 containing nil-amine, yet the SRI indicates that there is no significant benefit on this stain.*

As shown in Table 7, wash compositions K1 and L1 containing esteramines according to the present disclosure (i.e., Esteramines 1-2) especially provide improved grease cleaning in dilute wash conditions on lard and bacon grease compared to compositions I1, having no amine, and J1 that includes Polyetheramine 1, which is known to have strong grease performance.

Performance Example 4. Stability Testing (Stain Removal Upon Storage)

Ester compounds are known to be unstable in liquid detergent compositions, tending to hydrolyze over time.

To test relative stability of the esteramines of the present disclosure, detergent samples having various amines are prepared, are stored in plastic screw top bottles, and are compared to equivalent "fresh" detergent samples for stain removal benefits.

In Storage Test 1, a detergent sample is prepared and stored for four weeks in a controlled storage oven at 35°C ("aged"). Additionally, a "fresh" detergent sample is prepared on the day of testing and compared to the stored/aged samples. The grease stain removal wash test followed is

described above as in Performance Example 1 using a tergotometer and the grease stains prepared as in the method section.

Bacon grease stain removal results are shown in Table 8. The provided "SRI (fresh)" values are determined by comparing the stain removal of freshly prepared compositions of each treatment versus an unwashed stain; larger SRI values indicate better stain removal. The provided "delta-SRI" values are determined by comparing the stain removal of compositions after being stored for four weeks at 35°C, versus the stain removal of freshly prepared compositions of each treatment; positive delta-SRI values typically indicate comparatively improved stain removal benefits.

Table 8.

		Storage Test 1 (Bacon grease)	
Trial	**Amine**	**SRI (fresh)**	**Delta-SRI (aged 4 weeks, 35°C)**
M (comp.)	*None*	72.0	-4.7
N (comp.)	TEPA	80.3	2.0
O	Esteramine 1	85.3	-1.9
P	Esteramine 2	84.7	-2.0
	SD:	1.65	-4.6

As shown in Table 8, stored detergent compositions that include compositions comprising Esteramines 1-2 (i.e., Trials O and P) of this disclosure show, for example, strong grease removal benefits versus comparative example M containing no amine. Furthermore, stored detergent compositions that include Esteramines 1-2 show similar grease performance to similar freshly prepared detergents. The comparable results indicate that Esteramines 1-2 are reasonably stable in the detergent compositions upon storage. These results are unexpected, given the known hydrolysis tendencies of ester compounds.

Formulation Examples

Formulation Example 1. Heavy-Duty Liquid Laundry Detergent Compositions (North America)

Table 9.

Ingredients	Liquid Detergent 1 (wt%)	Liquid Detergent 2 (wt%)	Liquid Detergent 3 (wt%)
AES C_{12-15} alkyl ethoxy (1.8) sulfate	10.9	10.9	11.1
Alkyl benzene sulfonate [2]	1.56	1.56	9.86
Sodium formate	2.66	2.66	0.11
Calcium formate	-----	-----	0.097
Sodium hydroxide	0.21	0.21	0.68
Monoethanolamine (MEA)	1.65	1.65	2.80
Diethylene glycol (DEG)	4.10	4.10	1.23
Propylene glycol	-----	-----	8.39
AE9[3]	0.40	0.40	----
C16AE7	3.15	3.15	----
NI 24-9[13]	-----	-----	0.97
Esteramine[11]	1.04	2.30	1.00
Chelant[4]	0.18	0.18	0.29
Citric Acid	1.70	1.70	2.83
C_{12-18} Fatty Acid	1.47	1.47	1.09
Borax	1.19	1.19	2.00
Ethanol	1.44	1.44	1.47
Ethoxylated Polyethyleneimine [1]	1.35	1.35	1.85
Amphiphilic alkoxylated grease cleaning polymer[12]	----	----	0.940
A compound having the following general structure: bis((C_2H_5O)(C_2H_4O)n)(CH_3)-N^+-C_xH_{2x}-N^+-(CH_3)-bis((C_2H_5O)(C_2H_4O)n), wherein n = from 20 to 30, and x = from 3 to 8, or sulphated or sulphonated variants thereof	0.40	0.40	1.40
1,2-Propanediol	2.40	2.40	----
Protease (54.5 mg active/g)[9]	0.89	0.89	0.95
Mannanase: Mannaway® (25.6 mg active/g)[5]	0.04	0.04	----
Xyloglucanase: Whitezyme® (20 mg active/g)[14]	----	----	0.04
Cellulase: Carezyme™ (11.63 mg active/g) [15]	----	----	0.10
Amylase: Natalase® (29 mg active/g)[5]	0.14	0.14	0.34
Fluorescent Whitening Agents[10]	0.10	0.10	0.15
Water, perfume, dyes & other components	Balance		

1. Polyethyleneimine (MW = 600) with 20 ethoxylate groups per -NH.

2. Linear alkylbenzenesulfonate having an average aliphatic carbon chain length C_{11}-C_{12} supplied by Stepan, Northfield, Illinois, USA

3. AE9 is C_{12-13} alcohol ethoxylate, with an average degree of ethoxylation of 9, supplied by Huntsman, Salt Lake City, Utah, USA.

4. Suitable chelants are, for example, diethylenetetraamine pentaacetic acid (DTPA) supplied by Dow Chemical, Midland, Michigan, USA or Hydroxyethane di phosphonate (HEDP) supplied by Solutia, St Louis, Missouri, USA Bagsvaerd, Denmark

5. Natalase®, Mannaway® are all products of Novozymes, Bagsvaerd, Denmark.

6. Proteases may be supplied by Genencor International, Palo Alto, California, USA (e.g. Purafect Prime®) or by Novozymes, Bagsvaerd, Denmark (e.g. Liquanase®, Coronase®).

10. Suitable Fluorescent Whitening Agents are for example, Tinopal® AMS, Tinopal® CBS-X, Sulphonated zinc phthalocyanine Ciba Specialty Chemicals, Basel, Switzerland

11. Any of (non-alkoxylated) Esteramines 1-5 as described above

12. Amphiphilic alkoxylated grease cleaning polymer is a polyethyleneimine (MW = 600) with 24 ethoxylate groups per –NH and 16 propoxylate groups per –NH.

13. Huntsman, Salt Lake City, Utah, USA.

14. Novozymes A/S, Bagsvaerd, Denmark.

15. Novozymes A/S, Bagsvaerd, Denmark.

Formulation Example 2. Powdered Detergent Laundry Detergent Compositions

Table 10.

Ingredients	Powder Detergent 1 (wt%)
Linear alkylbenzenesulfonate[1]	8.2
AE3S[2]	1.9
Zeolite A[3]	1.8
Citric Acid	1.5
Sodium Carbonate[5]	29.7
Silicate 1.6R (SiO_2:Na_2O)[4]	3.4
Soil release agent[6]	0.2
Acrylic Acid/Maleic Acid Copolymer[7]	2.2
Carboxymethylcellulose	0.9
Protease - Purafect® (84 mg active/g)[9]	0.08
Amylase – Stainzyme Plus® (20 mg active/g)[8]	0.16
Lipase - Lipex® (18.00 mg active/g)[8]	0.24
Cellulase - Celluclean™ (15.6 mg active/g)[8]	0.1
Esteramine according to the present disclosure[10]	1.0
TAED [11]	3.26
Percarbonate[12]	14.1
Na salt of Ethylenediamine-N,N'-disuccinic acid, (S,S) isomer (EDDS)[13]	2.19
Hydroxyethane di phosphonate (HEDP)[14]	0.54

$MgSO_4$	0.38
Perfume	0.38
Suds suppressor agglomerate[15]	0.04
Sulphonated zinc phthalocyanine (active)[16]	0.0012
Sulfate/ Water & Miscellaneous	Balance

1. Linear alkylbenzenesulfonate having an average aliphatic carbon chain length C_{11}-C_{12} supplied by Stepan, Northfield, Illinois, USA
2. AE3S is C_{12-15} alkyl ethoxy (3) sulfate supplied by Stepan, Northfield, Illinois,USA
3. Zeolite A is supplied by Industrial Zeolite (UK) Ltd, Grays, Essex, UK
4. 1.6R Silicate is supplied by Koma, Nestemica, Czech Republic
5. Sodium Carbonate is supplied by Solvay, Houston, Texas, USA
6. Soil release agent is Repel-o-tex® PF, supplied by Rhodia, Paris, France
7. Acrylic Acid/Maleic Acid Copolymer is molecular weight 70,000 and acrylate:maleate ratio 70:30, supplied by BASF, Ludwigshafen, Germany
8. Savinase®, Natalase®, Stainzyme®, Lipex®, Celluclean™, Mannaway® and Whitezyme® are all products of Novozymes, Bagsvaerd, Denmark.
9. Proteases may be supplied by Genencor International, Palo Alto, California, USA (e.g. Purafect Prime®) or by Novozymes, Bagsvaerd, Denmark (e.g. Liquanase®, Coronase®).
10. Any of (non-alkoxylated) Esteramines 1-5 as described above
11. TAED is tetraacetylethylenediamine, supplied under the Peractive® brand name by Clariant GmbH, Sulzbach, Germany
12. Sodium percarbonate supplied by Solvay, Houston, Texas, USA
13. Na salt of Ethylenediamine-N,N'-disuccinic acid, (S,S) isomer (EDDS) is supplied by Octel, Ellesmere Port, UK
14. Hydroxyethane di phosphonate (HEDP) is supplied by Dow Chemical, Midland, Michigan, USA
15. Suds suppressor agglomerate is supplied by Dow Corning, Midland, Michigan, USA
16. Fluorescent Brightener 1 is Tinopal® AMS, Fluorescent Brightener 2 is Tinopal® CBS-X, Sulphonated zinc phthalocyanine and Direct Violet 9 is Pergasol® Violet BN-Z all supplied by Ciba Specialty Chemicals, Basel, Switzerland

Formulation Example 3. Powdered Laundry Additive

Table 11.

Ingredients	**Powder Additive 1 (wt%)**
Sodium percarbonate[5]	33.0
Tetraacetyl ethylene diamine[4]	10.0
nonanoyloxybenzene sulphonate[7]	7.5
Esteramine[3]	4.0
C12-C16 Alkylbenzene sulphonic acid	1.2
C14-C15 alkyl 7-ethoxylate[6]	0.25

Mannanase [1]	0.2
Cellulase [2]	0.2
Brightener[8]	0.1
Sodium sulphate	Balance

1. Mannaway, from Novozymes (Denmark), 4mg active enzyme per gram.
2. Celluclean, from Novozymes (Denmark), 15.6mg active enzyme per gram.
3. Any of (non-alkoxylated) Esteramines 1-5 as described above
4. TAED is tetraacetylethylenediamine, supplied under the Peractive® brand name by Clariant GmbH, Sulzbach, Germany
5. Sodium percarbonate supplied by Solvay, Houston, Texas, USA
6. AE7 is C_{14-15} alcohol ethoxylate, with an average degree of ethoxylation of 7, supplied by Huntsman, Salt Lake City, Utah, USA
7. NOBS is sodium nonanoyloxybenzenesulfonate, supplied by Future Fuels, Batesville, Arkansas, USA
8. Suitable Fluorescent Whitening Agents are for example, Tinopal® AMS, Tinopal® CBS-X, Sulphonated zinc phthalocyanine Ciba Specialty Chemicals, Basel, Switzerland

Formulation Example 4. Soluble Unit Dose (SUD) Detergent Compositions

The following composition may be encapsulated in water-soluble film, such as polyvinyl alcohol-based films (e.g., M8630 film, available from MonoSol, LLC) to form a unit dose article.

Table 12.

Ingredients	**SUD Detergent 1 (wt%)**
Anionic Surfactant HF LAS[1]	18.2
C14-15 alkyl ethoxy (2.5) sulfate	8.73
C14-15 alkyl ethoxy (3.0) sulfate	0.87
Nonionic Surfactant C24-9[2]	15.5
TC Fatty acid[15]	6.0
Citric Acid	0.6
FN3 protease[3]	0.027
FNA protease [4]	0.071
Natalase[5]	0.009
Termamyl Ultra[6]	0.002
Mannanase [7]	0.004
PEI ethoxylate dispersant[9]	5.9
RV-base[10]	1.5
DTPA[11]	0.6
EDDS[12]	0.5
Fluorescent Whitening Agent 49	0.1
1,2 propylene diol	15.3

Glycerol	4.9
Monoethanolamine	6.6
NaOH	0.1
Sodium Bisulfite	0.3
Calcium Formate	0.08
Polyethylene Glycol (PEG) 4000	0.1
Fragrance	1.6
Dyes	0.01
Esteramine[14]	1.0
Water	TO BALANCE 100%

1. Linear Alkyl Benzene Sulponate, Sasol, Lake Charles, LA
2. AE9 is C12-13 alcohol ethoxylate, with an average degree of ethoxylation of 9, supplied by Huntsman, Salt Lake City, Utah, USA
3. Protease supplied by Genencor International, Palo Alto, California, USA (e.g. Purafect Prime®)
4. Protease supplied by Genencor International, Palo Alto, California, USA
5. Natalase®supplied by Novozymes, Bagsvaerd, Denmark
6. Termamyl Ultra supplied by Novozymes, Bagsvaerd, Denmark
7. Mannanase®supplied by Novozymes, Bagsvaerd, Denmark
8. Whitezyme supplied by Novozymes, Bagsvaerd, Denmark
9. Polyethyleneimine (MW = 600) with 20 ethoxylate groups per –NH
10. Sokalan 101 Polyethyleneglycol-Polyvinylacetate copolymer dispersant supplied by BASF
11. Suitable chelants are, for example, diethylenetetraamine pentaacetic acid (DTPA) supplied by Dow Chemical, Midland, Michigan, USA
12. Ethylenediaminedisuccinic acid supplied by Innospec Englewood, Colorado, USA
13. Suitable Fluorescent Whitening Agents are for example, Tinopal® AMS, Tinopal® CBS-X, Sulphonated zinc phthalocyanine Ciba Specialty Chemicals, Basel, Switzerland
14. Any of (non-alkoxylated) Esteramines 1-5 as described above
15. Topped Coconut Fatty Acid Twin Rivers Technologies Quincy Massachusetts

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as “40 mm” is intended to mean “about 40 mm.”

Every document cited herein, including any cross referenced or related patent or application and any patent application or patent to which this application claims priority or benefit thereof, is

hereby incorporated herein by reference in its entirety unless expressly excluded or otherwise limited. The citation of any document is not an admission that it is prior art with respect to any invention disclosed or claimed herein or that it alone, or in any combination with any other reference or references, teaches, suggests or discloses any such invention. Further, to the extent that any meaning or definition of a term in this document conflicts with any meaning or definition of the same term in a document incorporated by reference, the meaning or definition assigned to that term in this document shall govern.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

CLAIMS

What is claimed is:

1. A cleaning composition comprising:

from about 1% to about 70%, by weight of the composition, of a surfactant system, preferably wherein the surfactant system comprises one or more surfactants selected from anionic surfactants, cationic surfactants, non-ionic surfactants, amphoteric surfactants, and mixtures thereof, and

from about 0.1% to about 10% of a non-alkoxylated esteramine, and/or a salt thereof, according to Empirical Formula I:

$$R^1 - [(CH_2)_c - O(O)C - R^2 - NH_2)_a]_b$$

(Empirical Formula I)

wherein:

R^1 is a C_4-C_{12} alkyl,

each R^2 is independently selected from branched or unbranched C_1-C_{12} substituted alkyl;

each index a is independently selected from an integer from 0 to 4, provided that at least one index value a is non-zero;

the index b is an integer from 1 to 4; and

each index c is independently 0 or 1.

2. A cleaning composition according to claim 1, wherein the R^1 is a C_6-C_{10} alkyl, more preferably a C_7-C_8 alkyl.

3. A cleaning composition according to any preceeding claim, wherein the R^1 is joined to the b substituent at a non-terminal carbon of R^1, more preferably wherein R^1 is joined to the b substituent at a 3-carbon position of the R^1.

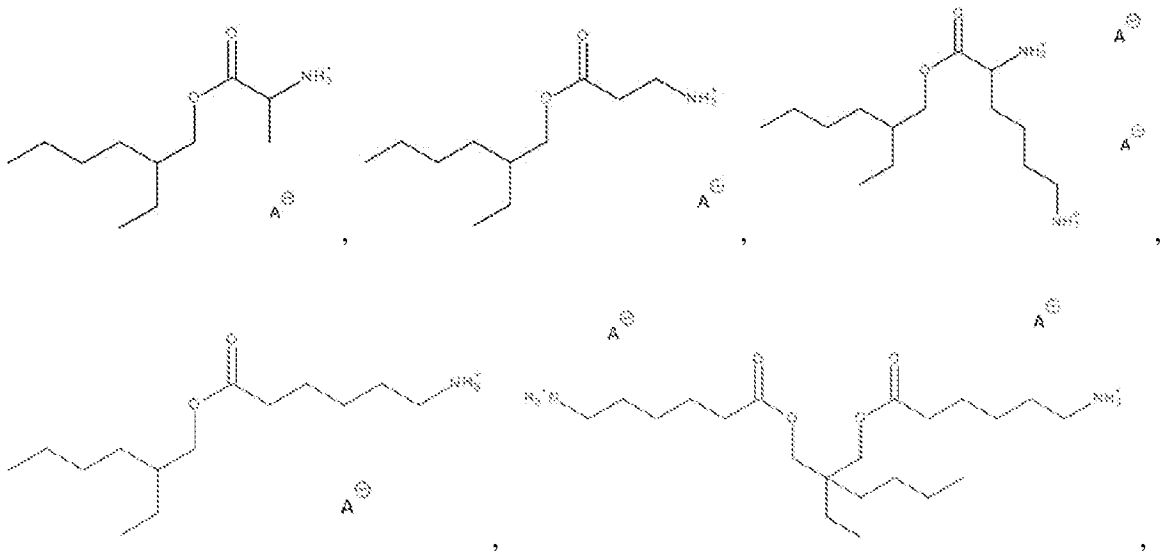
4. A cleaning composition according to any preceeding claim, wherein each R^2 is independently selected from branched or unbranched C_2-C_8 substituted alkyl, more preferably C_2-C_6 substituted alkyl.

5. A cleaning composition according to any preceeding claim, wherein each index a is independently selected from an integer from 0 to 3, more preferably 0 to 2, most preferably 1 to 2, provided that at least one index value a is non-zero.

6. A cleaning composition according to any preceeding claim, wherein the index b is an integer from 1 to 3, more preferably 1 to 2, even more preferably 1.

7. A cleaning composition according to any preceeding claim, wherein the non-alkoxylated esteramine is in salt form and coupled with charge-balancing anion A, wherein A is an anion derived from an acid selected from the group consisting methanesulfonic acid, toluene sulfonic acid, hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid, citric acid, lactic acid, C12-C18 fatty acid, alkyl benzene sulfonic acids, alkyl sulphonic acids, alkyl sulfate acids, alkyl ethyoxysulfate acids, alkoxylated or non-alkoxylated copolymers of acrylic acid and maleic acid, and mixtures thereof.

8. A cleaning composition according to any preceeding claim, wherein the non-alkoxylated esteramine is selected from the group consisting of:



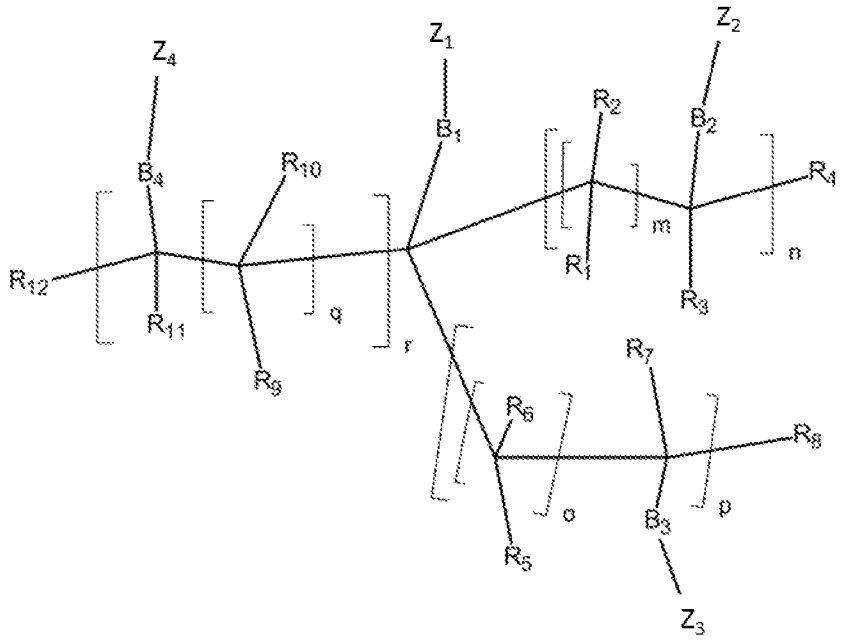
a non-salt form thereof, or a mixture thereof,

wherein A is a suitable charge-balancing anion.

9. A cleaning composition comprising:

from about 1% to about 70%, by weight of the composition, of a surfactant system, preferably wherein the surfactant system comprises one or more surfactants selected from anionic surfactants, cationic surfactants, non-ionic surfactants, amphoteric surfactants, and mixtures thereof, and

from about 0.1% to about 10% of a non-alkoxylated esteramine according to Formula (II) and/or a salt thereof,



(Formula II)

wherein independently from each other

n being an integer from 0 to 12,

m being an integer for each repetition unit n independently selected from 0 to 12;

p being an integer from 0 to 12,

o being an integer for each repetition unit p independently selected from 0 to 12;

r being an integer from 0 to 12,

q being an integer for each repetition unit r independently selected from 0 to 12;

B_1, B_2, B_3, and B_4 are independently from each other selected from the group consisting of a bond, linear C_1 to C_{12} alkanediyl groups, and branched C_1 to C_{12} alkanediyl groups;

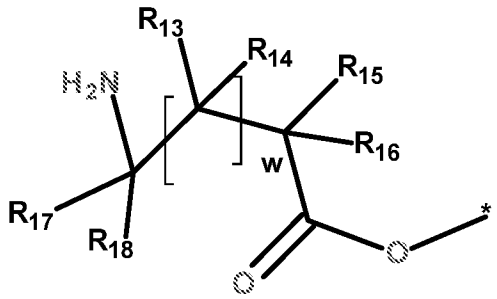
R_4, R_8, and R_{12} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_1, R_2, and R_3 being independently for each repetition unit o of each repetition unit p being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_5, R_6, and R_7 being independently for each repetition unit m of each repetition unit n being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl; and

R_9, R_{10}, and R_{11} being independently for each repetition unit q of each repetition unit r being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl,

Z_1, and/or Z_2, and/or Z_3, and/or Z_4, independently for each repetition unit n, p, and r, are selected from the group consisting of OH, alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III),



(Formula III)

wherein said compound according to Formula (III) connects to the compound according to Formula (II) via the bond labeled with *,

with independently from each other

w being an integer from 0 to 12;

R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl,

with the proviso that at least one substituent Z_1, and/or Z_2, and/or Z_3, and/or Z_4, is not OH.

10. A cleaning composition according to claim 9, wherein

n, p, and r are each equal to zero, and

Z_1 is selected from the group consisting of alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III),

with the proviso of at least one group R_4, R_8, and/or R_{12} containing at least 7 or more carbon atoms;

with independently from each other

w being an integer from 0 to 12;

R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl.

11. A cleaning composition according to any of claims 9-10, wherein

p and r are both equal to 0,

n is at least 1, and

Z_1 and Z_2, are independently selected from the group consisting of OH, alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, and a compound according to Formula (III),

with independently from each other

w being an integer from 0 to 12;

R_{13} and R_{14} independently for each repetition unit w being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl;

R_{15}, R_{16}, R_{17}, and R_{18} being selected from the group consisting of H, linear alkyl, branched alkyl, and cycloalkyl,

with the proviso that at least one substituent Z_1 and/or Z_2 is not OH, and with the proviso that R_3 contains equal to or more than 2 carbon atoms.

12. A cleaning composition according to any of claims 9-11, wherein the composition comprises a salt of the esteramine according to Formula (II), wherein the salt is formed by at least partial protonation of the amine group by an acid being a protic organic or inorganic acid, preferably an acid selected from the group consisting methanesulfonic acid, hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid, toluene sulfonic acid, citric acid, lactic acid, C12-C18 fatty acid, alkyl benzene sulfonic acids, alkyl sulphonic acids, alkyl sulfate acids, alkyl ethyoxysulfate acids, alkoxylated or non-alkoxylated copolymers of acrylic acid and maleic acid, and mixtures thereof.

13. A cleaning composition according to any preceding claim, wherein the cleaning composition is a liquid cleaning composition, preferably a liquid laundry composition.

14. A cleaning composition according to any preceding claim, wherein the cleaning composition further comprises an adjunct cleaning additive selected from the group consisting of builders, structurants or thickeners, clay soil removal/anti-redeposition agents, polymeric soil release agents, polymeric dispersing agents, polymeric grease cleaning agents, enzymes, enzyme stabilizing systems, bleaching compounds, bleaching agents, bleach activators, bleach catalysts, brighteners, dyes, hueing agents, dye transfer inhibiting agents, chelating agents, suds supressors, softeners, perfumes, and mixtures thereof, preferably wherein the adjunct cleaning additive comprises enzymes, more preferably enzymes selected from protease, amylase, and lipase, more preferably lipase.

15. A method of pretreating or treating a soiled fabric, the method comprising the step of contacting the soiled fabric with the cleaning composition of any preceding claim, preferably wherein the soiled fabric comprises a greasy stain.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2018/041014

A. CLASSIFICATION OF SUBJECT MATTER
INV. C11D3/33 C11D1/46 C11D3/30
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2015/193206 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]; CONOPCO INC DBA UNILEVER [US]) 23 December 2015 (2015-12-23) page 18, line 1 - page 20, line 13 -----	1,3-15
X	Maria Rosa Infante: "Amino acid-based surfactants - ScienceDirect", C. R. Chimie 7 (2004), 8 June 2004 (2004-06-08), pages 583-592, XP055506074, DOI: 10.1016/j.crci.2004.02.009 Retrieved from the Internet: URL:https://www.sciencedirect.com/science/article/pii/S163107480400116X [retrieved on 2018-09-11] figure scheme 3; table 1; compound Series 3 page 586 - page 587 -----	1-7,9, 10,12,14

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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Date of the actual completion of the international search	Date of mailing of the international search report
20 September 2018	27/09/2018

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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