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(71) Applicant: **Givaudan SA**

1214 Vernier-Genève (CH)

(72) Inventors:

- **Gautschi, Markus, Dr.**
4314 Zeiningen (CH)

- **Blondeau Philippe**

75010 Paris (FR)

- **Derrer, Samuel, Dr.**

8117 Fällanden (CH)

(74) Representative:

Patentanwälte

Schaad, Balass, Menzl & Partner AG

Dufourstrasse 101

Postfach

8034 Zürich (CH)

(54) **Fabric softener composition**

(57) The fabric softening composition comprises a surfactant as fabric softener and a fragrance precursor as well as an enzyme suitable for cleaving the fragrance precursor. Upon application of a solution of the softening composition to a fabric, the fragrance precursor is cleaved by the enzyme and a desired odor is imparted to the fabric.

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Description

[0001] The present invention relates to a fabric softening composition comprising a surfactant as fabric softener and a fragrance precursor according to claim 1, a process for preparing the fabric softening composition according to claim 13 and a process for imparting odor to a fabric according to claim 14.

[0002] The usual process for the cleaning of fabrics comprises washing the fabric with a detergent containing a surfactant, followed by rinsing and drying. Enzymes are incorporated into the detergents to improve the removal of stains. Proteases have been described to be useful in detergents to remove proteinaceous stains (US 3,723,250) and amylases have been described to be useful in detergent compositions to remove starchy stains (US 3,627,688). Lipases have been described to be useful in detergent compositions to improve the removal of fat soiling (US 4,810,414). The use of lipase in detergents has been reviewed by H. Andree et al., J. Applied Biochem. 1980, 2, 218-229. Further a non-dusting granulate containing a cellulase has been added to a detergent composition in order to reduce the harshness of the laundry (US 4,435,307).

[0003] It is also known that applying the enzyme in the rinsing step instead of the washing step improves the enzymatic effect. Advantageously, the enzyme is applied in the last rinsing step together with a fabric softening and/or anti-static agent (e.g. a cationic surfactant) (WO 91/13136). The addition of an enzyme during the last rinsing step improves the removal of fatty matters both with and without a cationic surfactant.

[0004] WO 95/11292 discloses a solid fabric softening composition for use in the rinsing step of a fabric washing process comprising a fabric softening conditioning compound, a lipase and a dispersing agent. With this solid fabric softening composition significant cleaning benefits on white cotton were obtained whilst the softening effect was maintained.

[0005] A principal strategy currently employed in imparting odors to consumer products is the admixing of the fragrance directly into the product. There are, however, several drawbacks to this strategy. The fragrance material can be too volatile, resulting in fragrance loss during manufacturing, storage, and use. Many fragrance materials are also unstable over time. This again results in loss during storage.

[0006] In many consumer products it is desirable for the fragrance to be released slowly over time. Microencapsulation and inclusion complexes with cyclodextrins have been used to help decrease volatility, improve stability and provide slow-release properties. However, these methods are for a number of reasons often not successful. In addition, cyclodextrins can be too expensive.

[0007] Fragrance precursors for scenting fabrics being washed in the presence of a lipase-containing detergent are described in WO 95/04809. The fragrance precursors are cleaved by the lipase and a single odoriferous compound, either an odoriferous alcohol, aldehyde or ketone is yielded. Thereby a prolonged scenting effect on the fabric is obtained. Despite this advantage problems remain with the stability of different types of fragrance precursors.

[0008] This problem was overcome by separating the enzyme and the fragrance precursor and incorporating the enzyme into the detergent and the fragrance precursor into the fabric softening composition. However, by this approach a scenting effect by the fragrance precursors can only be achieved if an enzyme containing detergent is used in the washing step. As most consumers are not familiar with the detergent and fabric softener technology, it is likely that a fabric softening composition containing a fragrance precursor is used in combination with a detergent not containing an enzyme and thus rendering the fragrance precursor system useless.

[0009] It is also known that during the laundry process some enzyme activity is lost, e.g. due to denaturation, or adsorption of the enzyme to soil. Therefore, the remaining enzyme activity may not be sufficient to cleave the fragrance precursors during the rinsing/drying cycle. In this case too, the precursor technology is not very efficient. This problem was partially overcome by increasing the dosage of enzyme, especially lipase, in the detergent. However, consumers have become increasingly aware of enzymes added to consumer goods which are manufactured by means of genetic engineering. Negative side effects usually associated with these enzymes, e.g. allergic reactions of the skin, have led to the marketing of safe, non-bio detergents. These type of non-bio detergents are not suitable in combination with enzyme cleavable fragrance precursors.

[0010] Currently used lipases e.g. Lipolase[®], remove fatty stains mainly during the last stages of rinsing and drying steps.

[0011] Thereby also esters of short chain acids are cleaved leaving an unpleasant smell on the fabric. The latter may be overcome by introduction of enzymes e.g. lipases that are especially active during the washing step. However, with these types of new lipases, e.g. Lipoprime[®], designed for good stain removal during the washing cycle, decrease in cleavage of fragrance precursors is observed during the drying cycle compared to Lipolase[®].

[0012] One object of the present invention is to provide a fragrance delivery system which yields a long lasting pleasant odor especially fresh odor or clean scent on the fabric.

[0013] A further object of the present invention is to provide a stable fragrance delivery system.

[0014] A further object of the present invention is to provide a fragrance delivery system which works without special measures to be taken by the user.

[0015] A further object of the present invention is to avoid the problems of the old delivery systems.

[0016] It has been found that a fabric softening composition, comprising a surfactant as fabric softener, a fragrance precursor and an enzyme suitable for cleaving the fragrance precursor, upon application to the rinsing step of a fabric cleaning process imparts a fresh, clean and long lasting scent to the fabric and solves the above mentioned problems.

5 **[0017]** The odor obtained after using the softening composition of the invention in the rinsing step is long lasting (up to 2-3 weeks) and is determined by the choice of the fragrance precursor(s).

[0018] It was surprising that the fabric softener composition of the invention is stable during storage. The odor develops generally during and/or after rinsing and during the drying cycle and continues for a longer period.

10 **[0019]** Due to the application of the fragrance precursor and the enzyme in the same composition or delivery system no special knowledge is needed and no special measures have to be taken to obtain the desired result.

[0020] The fabric softening composition of the invention comprises generally at least 0.01% preferably from about 0.01 to about 15 %, more preferably from about 0.1 to about 10 %, most preferably from about 0.2 to about 2 % per weight of one or more fragrance precursors.

15 **[0021]** An enzyme preferably selected from the group of lipase, cellulase, protease and amylase is present in the range of 0.001 to 5 mg, preferably 0.01 to 2 mg pure enzyme per liter of the fabric softening composition.

[0022] From about 1 to about 80 % per weight of the ingredients are surfactants and other substances useful in fabric softening compositions and known to the skilled person. Such substances are e.g. preservatives, fragrances and the like.

20 **[0023]** In a preferred embodiment of the fabric softening composition of the present invention the fabric softener and/or antistatic agents are cationic surfactants. Additionally, the fabric softening composition may contain a non-ionic surfactant assisting the dispersion of the cationic fabric softener in the water and improving the rewetability of the fabric. The compositions of the present invention preferably comprise from about 1 % to about 80%, preferably from about 3 to about 50 %, of a cationic surfactant. Dilute liquid compositions preferably contain from about 3 % to about 15 % of a cationic surfactant, whereas concentrated liquid compositions preferably contain from about 12 % to about 50 %, more preferably from about 12 % to about 35 % of a cationic surfactant.

25 **[0024]** The rinse added fabric softening composition of the present invention is preferably a liquid however, granular, gelatinous or viscous, clear or translucent liquid embodiments are also envisaged.

30 **[0025]** The pH value of the fabric softening compositions of the present invention is an important parameter influencing the stability of the fabric softener and preventing microbial infection of the composition. The pH as defined in the present context is measured in the neat fabric softening composition at 20° C. For optimum hydrolytic stability the pH of the neat composition is in the range from about 2.0 to about 5.0, preferably from about 2.0 to 3.5. The pH value of the composition can be adjusted to the desired range by addition of a Bronsted acid such as inorganic mineral acids, carboxylic acids and alkylsulfonic acids. The fragrance precursors, being preferably of the ester and carbonate type, and the fabric softeners of the ester type are stable under these acidic conditions in the composition. The acidic pH value also ensures a satisfactory enzyme stability, especially of lipase, cellulase, amylase and protease. Under said conditions good stability of fragrance precursors as well as of fabric softener and antistatic agents was observed over a prolonged period of time.

40 **[0026]** The fabric softening composition of the invention is dissolved or diluted in the rinsing step of the washing cycle and is deposited onto the fabric surface due to the high substantivity of the individual compounds to the fabric. At the pH value of about 7 of the rinsing liquor the enzyme is activated and the fragrance precursor is cleaved to release the fragrance. The release of the fragrance may start either in the rinsing step or during the drying step where the water content of the fabric is reduced. After drying the release of the fragrance continues. Depending on the precursors chosen, the fabric has during weeks a desired odor, e.g. fresh and clean.

45 **[0027]** By using a detergent containing an enzyme for stain removal during the washing step and thereafter a fabric softening composition of the present invention during the rinsing step a clean fabric with a long-lasting, fresh and clean scent can be obtained.

[0028] The fabric softening composition of the present invention may also comprise different fragrance precursors which are cleaved at different conditions and enzymes each being suitable to cleave at least one fragrance precursor.

50 **[0029]** The fabric softening compositions of the present invention may be prepared by mixing of the ingredients according to the art. Usually such a composition is prepared by first admixing the surfactants with water at an elevated temperature. After cooling further ingredients e.g. preservatives, fragrances etc. are added. The fragrance precursors and the enzymes can be added at any stage of the formulation. Preferably they are added at the last step of the mixing process. The fragrance precursor(s) can be added in neat form to the composition or preferably dissolved in a suitable solvent. Furthermore, the fragrance precursors can be added in encapsulated, spray-dried or any other "protected form" known to those skilled in the art. The enzyme(s) can be added as a liquid or in any other form e.g. dried, encapsulated, extruded or spray-dried. Furthermore, it is possible to prepare a coencapsulate, coextrudate or any other form comprising both the fragrance precursors(s) and the enzyme(s).

[0030] A fragrance precursor in the softening composition of the present invention may be a compound of formula



wherein

Y is a carrier residue, e.g. a polymer, a carbohydrate or any type of mono- or poly-carboxylic acid, to which a fragrant alcohol, aldehyde, ketone or oxime can be chemically bound,

L is a bivalent linker residue, e.g. dicarboxylic acids, amino acids, hydroxy acids and the like,

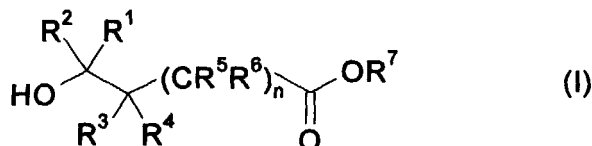
R represents the residue of a fragrant alcohol, oxime, or of the enol form of a fragrant aldehyde or ketone,

m is 0 or an integer from 1 to n and

n is an integer ≥ 1 and if $n > 1$ the residues R may be the same or different.

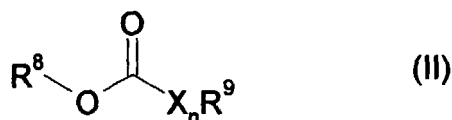
[0031] Fragrance precursors that meet this general formula are e.g. described in WO 95/04809, in WO 96/02625, in WO 97/16523 or in WO 98/07683.

[0032] Preferred fragrance precursors are compounds of the formula I



in which n is 1, 2 or 3 and R^1 to R^6 represent, independently, substituted or unsubstituted alkyl-, alkenyl-, alkynyl-, cycloalkyl-, cycloalkenyl- or aromatic-residues or hydrogen wherein these residues may in addition contain one or more -O- and/or -C(O)- groups, R^7 represents a residue of a fragrant alcohol R^7OH , whereby one or two rings can be built by the combination of the respective R^1 to R^6 and this/these ring(s) can be further substituted by alkyl-groups;

or of formula II



wherein

R^8 represents the residue of the enol form of an aldehyde or ketone,

X represents a saturated or unsaturated bivalent hydrocarbon residue with a straight or branched chain with 1 to 20 carbon atoms optionally containing one or more heteroatoms, such as O, N, S and/or P and/or a group -C(O)- and/or substituents of the formula -COOY, -OH, -C(O)-, or -NH₂ and Y is H, a metal atom or R^{11} , and R^{11} is the rest of an alcohol or phenol $R^{11}OH$ or has the same definition as R^8 and is the same or different as R^8 ,

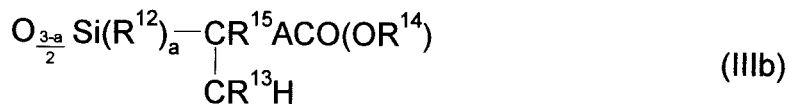
R^9 represents saturated or unsaturated, substituted or unsubstituted carbocyclic or heterocyclic residue or -COOY, wherein Y is H, a metal atom or R^{10} , and R^{10} is the rest of an alcohol or phenol or has the same definition as R^8 and is the same or different as R^8 , and R^9 can be H if X is substituted by -OH,

n is 0 or 1;

or of formula IIIa



or of formula IIIb

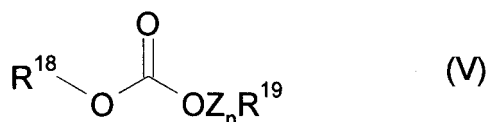


or a mixture thereof and if any other unit(s) in the said siloxanes being present this/these is/are of the formula IV



wherein R^{12} represents a substituted or unsubstituted C_{1-8} alkyl group or a substituted or unsubstituted aryl group, R^{16} represents a hydrogen atom, a monovalent C_{1-8} hydrocarbon group or a monovalent C_{1-8} halogenated hydrocarbon group; R^{13} represents a hydrogen atom or a substituted or unsubstituted C_{1-8} alkyl group or a substituted or unsubstituted aryl group or a bond connecting CR^{13} and CR^{15} ; R^{15} represents a hydrogen atom or a substituted or unsubstituted C_{1-8} alkyl group or a substituted or unsubstituted aryl group; A represents $(\text{C R}^{17}_2)_n$ whereby R^{17} represents a substituted or unsubstituted C_{1-8} alkyl group or a substituted or unsubstituted aryl group or a hydrogen atom, n has a value of 0-20, preferably 1 to 10, and each R^{17} is the same or different; OR^{14} represents the residue of an olfactive alcohol or of the enol form of an olfactive aldehyde or olfactive ketone; a has a value of 0, 1 or 2; b has a value of 0, 1, 2 or 3;

or of formula V



wherein

R^{18} represents the residue of the enol form of an aldehyde or ketone,

R^{19} represents a saturated or unsaturated, substituted or unsubstituted $\text{C}_1\text{-C}_{30}$ aliphatic residue with straight or branched chains optionally having one or more heteroatoms in the chain, the residue of the enol form of an aldehyde or ketone, the residue of an alcohol, $-\text{COOY}$ or $-\text{OCOY}$, wherein Y is H, a metal atom or R^{20} , and R^{20} is the rest of an alcohol R^{20}OH or has the same definition as R^{18} .

Z represents a saturated or unsaturated bivalent hydrocarbon residue with a straight or branched chain with 1 to 30 carbon atoms optionally containing one or more heteroatoms, and/or a group $-\text{C}(\text{O})-$ and/or substituents of the formula $-\text{COOY}$, $-\text{OCOY}$, $-\text{OH}$, $-\text{C}=\text{O}$, or $-\text{NH}_2$ and Y is H, a metal atom or R^{21} , and R^{21} is the rest of an alcohol R^{21}OH or has the same definition as R^{18} and is the same or different as R^{18} and

n is 0 or 1,

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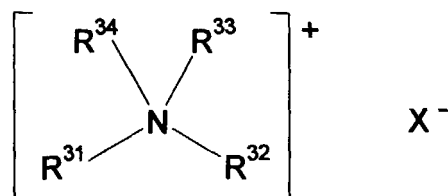
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are e.g. described by R. Puchta, J. American Oil Chem. Soc. 1984, 61, 367-376 or by G. R. Whalley, *happi* 1995, February, 55-58. Preferred fabric softening agents which are constituents of the rinse added fabric softening compositions of the present invention are exemplified in the following without limiting the invention thereto.

[0036] Preferred surfactants are cationic quaternary ammonium salts having two long hydrocarbly chains, for instance two C₈₋₂₈, preferably C₁₂₋₂₄, hydrocarbly chains. Preferably the hydrocarbly groups are alkyl or alkenyl groups, which are optionally substituted or interrupted by other groups. Well-known species of substantially water-insoluble quaternary ammonium compounds have the formula:

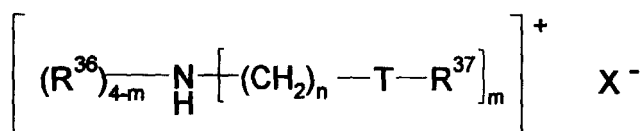


wherein each of R³¹ and R³² is independently selected from hydrocarbly groups of from about 8 to about 28, preferably about 12 to about 24 carbon atoms; R³³ and R³⁴ represent hydrocarbly groups containing from 1 to about 4 carbon atoms; and X is an anion, preferably selected from halide, methosulphate and ethylsulphate radicals. Representative examples of these quaternary softeners include ditallow dimethyl ammonium chloride; ditallow dimethyl ammonium methyl sulphate; dihexadecyl dimethyl ammonium chloride; di(hydrogenated tallow) dimethyl ammonium methyl sulphate; dihexadecyl diethyl ammonium chloride; di(coconut) dimethyl ammonium chloride.

[0037] Ditallow dimethyl ammonium chloride, di(hydrogenated tallow) dimethyl ammonium chloride, di (coconut) dimethyl ammonium chloride and di(coconut) dimethyl ammonium methosulphate are preferred.

[0038] Suitable materials also include dialkyl ethoxyl methyl ammonium methosulphate based on soft fatty acid, dialkyl ethoxyl methyl ammonium methosulphate based on hard fatty acid, and a material in which R³³ and R³⁴ represent methyl, R³¹ is C₁₃₋₁₅, R³² is CH₂CH₂OCO³⁵ where R³⁵ is stearyl, and X is methosulphate.

[0039] The quaternary ammonium compound may be an ester-linked quaternary ammonium compound represented by the formula:



wherein each R³⁶ group is independently selected from C₁₋₆ hydrocarbly, such as alkyl, alkenyl or hydroxyalkyl groups; and wherein each R³⁷ group is independently selected from C₈₋₂₈ linear or branched hydrocarbly, such as alkyl or alkenyl groups;

T is

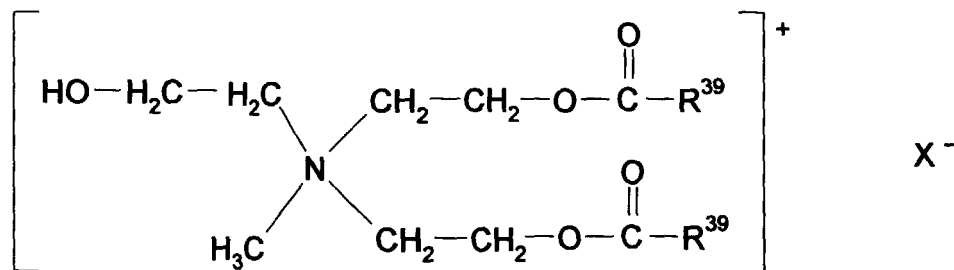


n is an integer from 0-5 and m is an integer from 1-4;

X⁻ is an anion which is compatible with fabric softening ingredients, preferably selected from halide, methosulphate

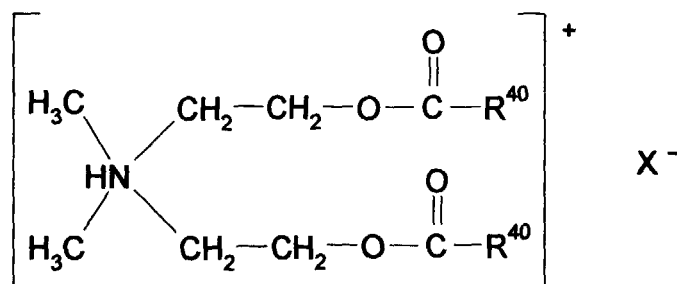
and ethylsulphate residues.

[0040] A preferred material of this type is that of formula:



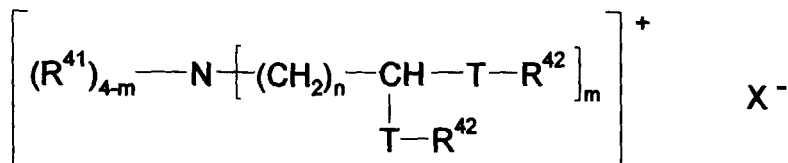
wherein each R^{39} is a linear or branched alkyl or alkenyl chain comprising at least 11 atoms such as tallow and X^- is as defined above and, in particular, is methosulphate. A material having R^{39} of tallow and X^- of methosulphate is available from Witco under the trade name Rewoquat WE 18. Another example of this type of suitable material has R^{39} of partially hardened tallow and X^- of methosulphate.

[0041] Another preferred class of surfactants containing two ester groups is:



wherein R^{40} is a linear or branched alkyl or alkenyl residue such as tallow, or partially hardened tallow. Preferred choices of X^- are chloride or methosulphate.

[0042] Other ester-linked quaternary ammonium compounds, which may be used in the compositions of the present invention, are those of formula:



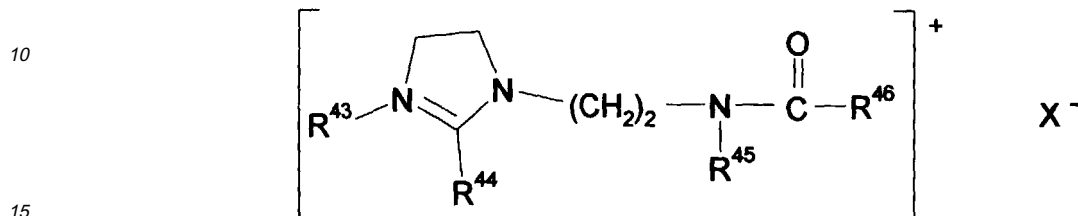
wherein each R^{41} is independently selected from C_{1-4} hydrocarbyl, such as alkyl, alkenyl or hydroxyalkyl groups; and each R^{42} is independently selected from C_{8-28} linear or branched hydrocarbyl, such as alkyl and alkenyl groups;

T has the meaning as described above;

n is an integer of from 0-5 and m is an integer from 1-4;

X⁻ is an anion preferably selected from halide, methosulphate and ethylsulphate residues.

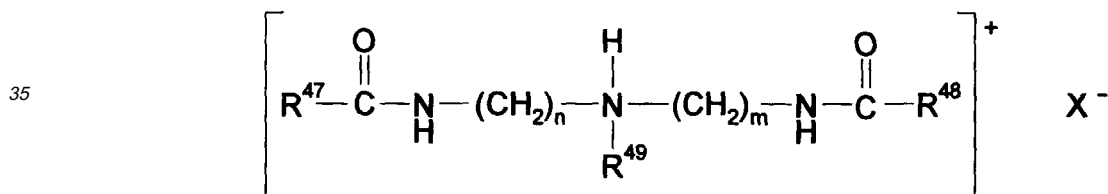
- 5 **[0043]** Another class of preferred water-insoluble cationic fabric softeners are the hydrocarbylimidazolinium salts believed to have the formula:



- 20 wherein R⁴³ is a hydrocarbyl group containing from 1 to 4, preferably 1 or 2 carbon atoms, R⁴⁶ is a hydrocarbyl group containing from 8 to 25 carbon atoms, R⁴⁴ is a linear or branched hydrocarbyl group containing from 8 to 25 carbon atoms and R⁴⁵ is hydrogen or a hydrocarbyl containing from 1 to 4 carbon atoms and X⁻ is an anion, preferably a halide, methosulphate or ethylsulphate.

- 25 **[0044]** Preferred imidazolinium salts include 1-methyl-1-(tallowylamido-) ethyl-2-tallowyl-4, 5-dihydroimidazolinium methosulphate and 1-methyl-1-(palmitoylamido) ethyl-2-octadecyl-4,5-dihydroimidazolinium chloride. Other useful imidazolinium materials are 2-heptadecyl-1-methyl-1-(2-stearyl-amido)-ethyl-imidazolinium chloride and 2-lauryl-1-hydroxyethyl-1-oleyl-imidazolinium chloride.

- 30 **[0045]** Another class of preferred fabric softeners is an inorganic or organic acid salt of a fabric softening compound of formula:

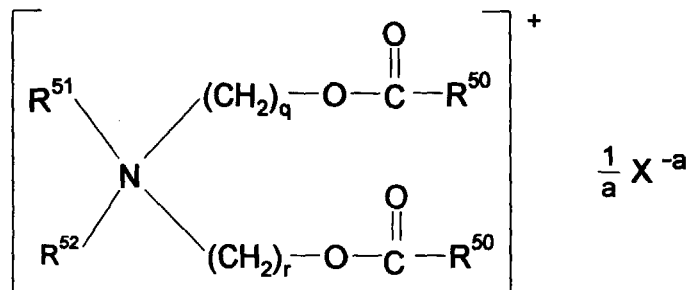


- 45 wherein R⁴⁷ and R⁴⁸ independently represent C₁₂ to C₃₀ aliphatic hydrocarbon residues; R⁴⁹ represents (CH₂CH₂O)_pH, CH₃ or H; n = 1 to 5, m = 1 to 5 and p = 1 to 10.

- 50 **[0046]** Another preferred class of fabric softener is a biodegradable fatty ester quaternary ammonium compound of formula:

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wherein each R⁵⁰ independently represents an aliphatic hydrocarbon residue having from 8 to 22 carbon atoms; R⁵¹ represents (CH₂)_sR⁵³ where R⁵³ represents an alkoxy carbonyl residue containing from 8 to 22 carbon atoms, benzyl, phenyl, C₁-C₄-alkyl substituted phenyl, OH or H; R⁵² represents (CH₂)_tR⁵⁴ where R⁵⁴ represents benzyl, phenyl, C₁-C₄-alkyl substituted phenyl, OH or H; q, r, s and t each independently, represent a number from 1 to 3; and X⁻ is an anion of valence a.

[0047] Other ingredients that have fabric softening effects and/or antistatic effects are also valuable ingredients for the fabric softening composition of the present invention. Such variations are not to be regarded as a departure from the spirit and scope of the invention and all such modifications are intended to be included within the scope of the following claims.

[0048] According to the present invention the fabric softening composition further comprises an enzyme, preferably a lipase and/or a cellulase and/or a protease and/or an amylase. However, any other type of enzyme suitable to cleave fragrance precursors used in the present invention is possible. Such other enzymes are not to be regarded as a departure from the spirit and scope of the invention and all are intended to be included within the scope of the following claims.

[0049] Lipases of plant or animal origin (e.g. pancreas lipase) can be used in the invention, but microbial lipases are preferred for reasons of economy. Some are known to be active in detergents. Since the conditions in the rinsing step are favourable for most lipases, many other lipases can be used. Examples are lipases derived from the following microorganisms, indicated with reference:

Humicola, e.g. *H. insolens* (US 4,810,414)
Pseudomonas, e.g. *Ps. cepia* or *Ps. fluorescens* (WO 89/04361)
Fusarium, e.g. *F. oxysporum* (EP 130,064)
Mucor (also called Rhizomucor), e.g. *M. miehei*
Candida, e.g. *C. cylindracea* (also called *C. rugosa*) or *C. antarctica* (WO 88/02775)

Preferred lipases are commercially available enzymes, e.g.

Lipolase[®], Lipolase Ultra[®] and LipoPrime[®] (Novo Nordisk)

[0050] Proteases of plant or animal origin can be used in the invention, but microbial proteases are preferred for reasons of economy. Proteases useful in the present invention may be e.g. derived from *Bacillus licheniformis*. Preferred proteases are commercially available enzymes, e.g. Alcalase[®], Savinase[®], Everlase[®] and Esperase[®] from Novo Nordisk; Purafect[®], Purafect[®] OX and Properase[®] from Genencor.

[0051] Amylases of plant or animal origin can be used in the invention, but microbial amylases are preferred for reasons of economy. Amylases useful in the present invention may be e.g. derived from *Bacillus subtilis*. Preferred amylases are commercially available enzymes, e.g. Teramyl[®], BAN, and Duramyl[®] from Novo Nordisk, and purastar[™] ST and Purastar[™] OxAm from Genencor.

[0052] Cellulases of plant or animal origin can be used in the invention, but microbial cellulases are preferred for reasons of economy. Cellulases useful in the present invention may be e.g. derived from *Humicola insolens*. Preferred cellulases are commercially available enzymes, e.g. Celluzyme[®], and Carezyme[®] from Novo Nordisk, and Puradex[™] HA and Detergent Cellulase L from Genencor.

[0053] Compositions of the present invention may also comprise dispersing agents for assisting the dispersion of the fabric softeners in water. Suitable dispersing agents are known to those skilled in the art and include nonionic surfactants such as alkoxylated fatty alcohols and fatty acid partial esters of polyhydric alcohols, e.g. glycerol, erythrol, sorbitol and the like.

5 **[0054]** The compositions of the present invention may be stabilized against microbial infection, preferably by incorporation of a stabilizing agent such as inorganic salts, e.g. NaCl, sugars, e.g. sucrose and glucose, polyols, e.g. glycerol and propylene glycol, and alcohols, e.g. ethanol and isopropanol. These stabilizing agents are usually effective in amounts above 10%, especially above 20%. Other examples include organic acids such as benzoic acid, sorbic acid and the like that are generally effective in amounts of 0.01-2% at low pH (below 5). Other stabilizing agents are antioxidants, e.g. sulphur dioxide, 1,2-benz-iso-thiazolin-3-one (BIT) and parabens. Further additives may be added to improve enzyme stability in the fabric softening composition. These additives are selected depending on the nature of the enzyme(s) used in the fabric softening composition and are known by those skilled in the art.

10 **[0055]** The compositions of the invention may further comprise other optional ingredients such as perfume, perfume carriers, fluorescers, colorants, hydrotropes, antifoaming agents, antiredeposition agents, optical brightening agents, anti-shrinking agents, anti-wrinkle agents, fabric crisping agents, anti-spotting agents, soil release agents, germicides, linear or branched silicones, fungicides, antimicrobial agents, antioxidants, preservatives, dyes, bleaches and bleach precursors, ironing aids. These optional ingredients, if added, are preferably present at levels up to 5% by weight of the composition.

20 **EXAMPLE 1**

[0056] A fabric softening composition of the present invention of the ester quat type, 4 x concentrate, was formulated as follows:

INGREDIENTS**CHEMICAL NAME****%****Part A**

DEIONIZED WATER		to 100.0
MgCl ₂ (saturated sol.)	magnesium chloride	1.0

Part B

REWOQUAT WE 18	di-(tallow carboxyethyl) hydroxy-ethyl methylammonium methosulfate	15.0
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GENAPOL O 100	ethoxylated fatty alcohol C16-C18 10EO	2.0
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ANTIFOAM DB 31		0.5
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Part C

ISOPROPYL ALCOHOL		3.0
PRESERVATIVE		QS

FRAGRANCE PRECURSOR ¹⁾		0.5
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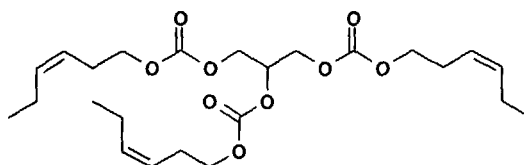
LIPOLASE® 100L		0.05
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While stirring and heating to 65° C, part A was mixed with part B (preheated to 65° C). After cooling to room temperature, part C was added to the mixture of A and B.

The pH value of the finished product is 2.60.

1) Fragrance Precursor:

carbonic acid 2,3-bis-[Z]-hex-3-enyloxycarbonyloxy-
propyl ester [Z]-hex-3-enyl ester



EXAMPLE 2

[0057] A fabric softening composition of the present invention of the ester quat type, 1 x concentrate, was formulated as follows:

INGREDIENTS

CHEMICAL NAME

%

Part A

DEIONIZED WATER

to 100.0

Part B

REWOQUAT WE 18

di-(tallow carboxyethyl)
hydroxy-ethyl methylammonium
methosulfate

6.0

DOBANOL 25-9

ethoxylated fatty alcohol
C12-C15 9EO

0.5

ANTIFOAM DB 31

0.1

Part C

MYACIDE BT 30

2-bromo-2-nitropropane
1,3 diol

0.03

PROXEL GXL

benzisothiazolinone
sodium salt

0.02

FRAGRANCE PRECURSOR²⁾

0.5

LIPOLASE® 100L

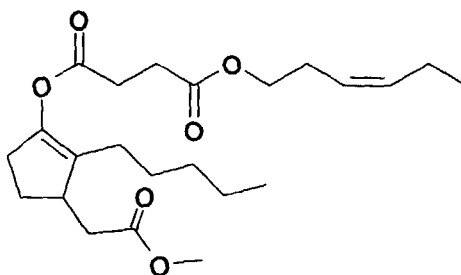
0.05

While stirring and heating to 65° C, part A was mixed with part B (preheated to 65° C). After cooling to room temperature, part C was added to the mixture of A and B.

The pH value of the finished product is 3.50.

²⁾ Fragrance Precursor:

succinic acid (Z)-hex-3-enyl ester 3-methoxycarbonylmethyl-2-pentyl-cyclopent-1-enyl ester

**EXAMPLE 3**

[0058] A fabric softener composition of the present invention of the quat conc. type, was formulated as follows:

INGREDIENTS**CHEMICAL NAME****%**

5

Part A

10

DEIONIZED WATER

to 100.0

CaCl₂

calcium chloride

0.6

15

Part B

ARQUAD 2 HT 75

13.0

20

Part C

25

DOW CORNING DB100

silicone

0.2

30

FORMALDEHYDE (10%)

0.15

35

FRAGRANCE PRECURSOR³⁾

0.5

40

LIPOLASE® 100L

0.05

45

50

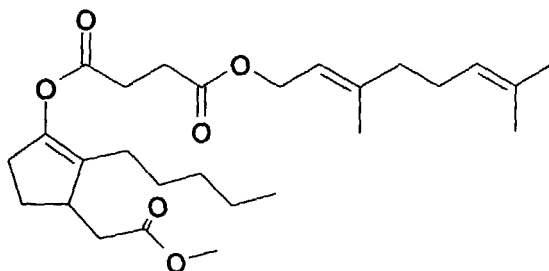
55

While stirring and heating to 65° C, part A was mixed with
 part B (preheated to 65° C). After cooling to room
 temperature, part C was added to the mixture of A and B.

The pH value of the finished product is 3.20.

3) Fragrance Precursor:

succinic acid 3,7-dimethyl-octa-2,6-dienyl ester 3-
 methoxycarbonylmethyl-2-pentyl-cyclopent-1-enyl ester



EXAMPLE 4

[0059] A fabric softener composition of the present invention of the quat 1x conc. type, was formulated as follows:

INGREDIENTS

CHEMICAL NAME

%

Part A

DEIONIZED WATER

to 100.0

Part B

ARQUAD 2 HT 75

4.5

Part C

ISOPROPYL ALCOHOL

0.85

MYACIDE	2-bromo-2-nitropropane 1,3-diol	0.03
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5

PROXEL GXL	benziosthiazoline sodium salt	0.02
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10

FRAGRANCE PRECURSOR ⁴⁾		0.5
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15

LIPOLASE® 100L		0.05
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20

While stirring and heating to 65° C, part A was mixed with part B (preheated to 65° C). After cooling to room temperature, part C was added to the mixture of A and B.

25

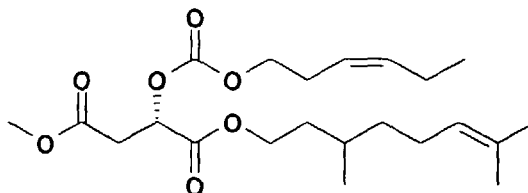
The pH value of the finished product is 3.20.

⁴⁾ Fragrance Precursor:

30

2-(Z)-hex-3-enyloxycarbonyloxy-succinic acid 4-(3,7-dimethyl-oct-6-enyl) ester 1-methyl ester

35



40

45

EXAMPLE 5

[0060] A fabric softener composition of the present invention of the ester quat type, 4 x concentrate, was formulated as follows:

50

55

INGREDIENTS**CHEMICAL NAME****%****Part A**

DEIONIZED WATER

to 100.0

MgCl₂ (saturated sol.) magnesium chloride

1.0

Part B

REWOQUAT WE 18

di-(tallow carboxyethyl)
hydroxy-ethyl methylammonium
methosulfate

15.0

GENAPOL O 100

ethoxylated fatty alcohol
C16-C18 10EO

2.0

ANTIFOAM DB 31

0.5

Part CISOPROPYL ALCOHOL
PRESERVATIVE3.0
QSFRAGRANCE PRECURSOR⁵⁾

0.5

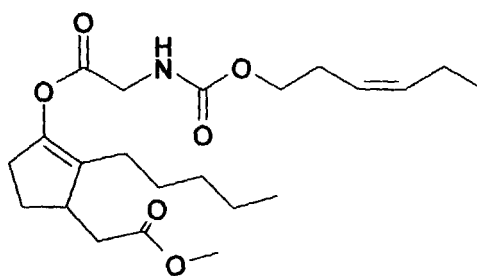
SAVINASE® (16.0 L EX)

0.05

While stirring and heating to 65° C, part A was mixed with
part B (preheated to 65° C). After cooling to room
temperature, part C was added to the mixture of A and B.

The pH value of the finished product is 2.60.

5) Fragrance Precursor:



(Z)-hex-3-enyloxycarbonylamino-acetic acid 3-methoxy-carbonylmethyl-2-pentyl-cyclopent-1-enyl ester.

EXAMPLE 6

[0061] Washing and rinsing tests with the fabric softening compositions of the present invention demonstrate the long lasting fragrance delivery.

35	Fabric:	2 cotton terry towels size: 50x90 cm; weight: 250g/towel.
40	Washing:	Miele WS 5405. Detergent wash cycle : 40° C (program 4). Detergent: A-C, as indicated below.
45	Rinsing:	Miele WS 5405. The fabric softening composition is added to the washing compartment via the dispenser. Fabric softening composition: D-L, as indicated below. Dosage of regular fabric softening composition (examples 2 and 4): 110 g. Dosage of concentrated fabric softening composition (examples 1 and 3): 35 g.
50	Evaluation:	After the washing and rinsing steps the towels are placed in a basket. The odor of the wet towels is evaluated by a panel of 10 perfumers. The towels are line dried at ambient temperature overnight and are evaluated after 2, 5, 10 and 20 days by a panel of 10 perfumers. The panelists are asked to evaluate each towel and to indicate whether the fragrance material can be perceived. Panelists are also asked to indicate the preference of the two towels being presented, one being the control towel and one being the towel treated with the fabric softening composition of the present invention.
55	Detergent A:	commercially available compact detergent, without enzymes

Detergent B: commercially available compact detergent comprising ca. 0.05-0.2% of lipase

Detergent C: detergent A
addition of 0.05% LIPOLASE® 100T

Fabric softening composition D: according to example 1

Fabric softening composition E: according to example 1
without Lipolase® 100L

Fabric softening composition F: according to example 3

Fabric softening composition G: according to example 3
without Lipolase® 100L

Fabric softening composition H: according to example 2, comprising 0.3 % of Carbonic acid 2,3-bis-[Z]-hex-3-enyloxycarbonyloxy-propyl ester [Z]-hex-3-enyl ester ⁽¹⁾ as the fragrance precursor.

Fabric softening composition I: according to example 2, comprising 0.3 % of Carbonic acid 2,3-bis-[Z]-hex-3-enyloxycarbonyloxy-propyl ester [Z]-hex-3-enyl ester ⁽¹⁾ as the fragrance precursor, without LIPOLASE® 100L.

Fabric softening composition K: according to example 4, comprising 0.3 % of Carbonic acid 2,3-bis-[Z]-hex-3-enyloxycarbonyloxy-propyl ester [Z]-hex-3-enyl ester ⁽¹⁾ as the fragrance precursor.

Fabric softening composition L: according to example 4, comprising 0.3 % of Carbonic acid 2,3-bis-[Z]-hex-3-enyloxycarbonyloxy-propyl ester [Z]-hex-3-enyl ester ⁽¹⁾ as the fragrance precursor, without LIPOLASE® 100L.

EXAMPLE 7

[0062] 2 towels labeled #1 are washed with detergent A and subsequently rinsed with fabric softening composition D, 2 other towels labeled #2 are washed with detergent B and subsequently rinsed with fabric softening composition E, as described in example 6.

[0063] In a paired, blind test the panelists were asked to indicate the strength of the fragrance (cis-3-hexenol) and to indicate the preference of towel#1 or towel#2. The strength was rated as: no sensation, barely detectable, weak, moderate, strong, very strong, strongest imaginable.

Time	Strenght ¹⁾		Preference ²⁾	
	Towel#1	Towel#2	Towel#1	Towel#2
Wet	moderate	weak	8	2
2 days	strong	moderate	10	0
5 days	strong	weak	10	0
10 days	moderate	barely detect.	10	0
20 days	weak	no sensation	10	0

1) Average of panelist opinion

2) Indicated as how many out of the 10 panelists

[0064] By using the fabric softening composition of the present invention, comprising a fragrance precursor for cis-3-hexenol, a fresh and clean green fragrance can be perceived up to three weeks. At most evaluation stages the towels treated with the fabric softening composition of the present invention were preferred by all 10 perfumers participating in the evaluation.

EXAMPLE 8

[0065] 2 towels labeled #1 are washed with detergent A and subsequently rinsed with fabric softening composition F, 2 other towels labeled #2 are washed with detergent B and subsequently rinsed with fabric softening composition G, as described in example 5.

[0066] In a paired, blind test the panelists were asked to indicate the strength of the fragrance (Hedione® and geraniol) and to indicate the preference of towel#1 or towel#2. The strength was rated as: no sensation, barely detectable, weak, moderate, strong, very strong, strongest imaginable.

Time	Strenght ¹⁾		Preference ²⁾	
	Towel#1	Towel#2	Towel#1	Towel#2
Wet	moderate	moderate	8	2
2 days	strong	moderate	9	1
5 days	strong	moderate	10	0
10 days	moderate	weak	10	0
20 days	weak	weak	10	0

1) Average of panelist opinion

2) Indicated as how many out of the 10 panelists

[0067] By using the fabric softening composition of the present invention, comprising a fragrance precursor for Hedione® and geraniol, a fresh and clean floral fragrance can be perceived up to three weeks. At most evaluation stages the towels treated with the fabric softening composition of the present invention were preferred by all 10 perfumers participating in the evaluation.

EXAMPLE 9

Stability test:

[0068] According to example 6 towels labeled #1, #2, #3, and #4 have been washed using the detergents and softeners given in the table below. All detergents and softeners used have been stored in glass bottles at 37°C for 1 month. The towels were lined dried and the strength of cis-3-hexenol, the fragrant material to be released slowly, was evaluated in a blind test by a panel of 10 trained perfumers. The strength was rated as: no sensation, barely detectable, weak, moderate, strong, very strong, strongest imaginable.

Towels	Detergent	Softener	Cis-3-hexenol strength ¹⁾	
			24 h	48 h
#1	A	H	weak	moderate
#2	C	I	weak	weak
#3	A	K	weak	moderate
#4	C	L	weak	weak

1) Average of panelist opinion

[0069] After one month of storage equal or better results in strength were obtained for the fabric softening compositions of the present invention compared to a combination of detergent/softener where the precursor and the enzyme are separated, thus demonstrating the stability of the fabric softening compositions of the present invention.

[0070] The invention being thus described, it will be obvious that the same may be varied in many ways. Such var-

iations are not to be regarded as a departure from the spirit and scope of the invention and all such modifications are intended to be included within the scope of the following claims.

Claims

5

1. Fabric softening composition comprising a surfactant as fabric softener and a fragrance precursor, characterized by comprising an enzyme suitable for cleaving the fragrance precursor and by imparting odor to a fabric upon application of a solution of the softening composition.
- 10 2. Composition according to claim 1 comprising 1 to 80 % by weight of a cationic surfactant.
3. Composition according to claim 2 comprising a nonionic surfactant.
4. Composition according to any of the preceding claims comprising one or more enzymes selected from the group of protease, amylase, lipase and cellulase.
- 15 5. Composition according to any of the preceding claims comprising a fragrance precursor of the formula



20

wherein Y is a carrier residue, L is a bivalent linker residue, m is 0 or an integer 1 to n, R is the residue of a fragrance molecule, yielding upon cleavage a fragrance RH and n is an integer ≥ 1 .

25

6. Composition according to claim 5 comprising a fragrance precursor of the formula



wherein R is the residue of a fragrant alcohol, oxime or of the enol form of an aldehyde or ketone.

- 30 7. Composition according to any of the preceding claims comprising fragrance precursors cleaved at different conditions and enzymes each being suitable to cleave at least one fragrance precursor.
8. Composition according to any of the preceding claims comprising an enzyme which is active at a water concentration of below 100 % based on the weight of the dry fabric.
- 35 9. Composition according to any of the preceding claims comprising 0.01 to 15 % per weight of a fragrance precursor.
10. Composition according to any of the preceding claims having a pH value of ≤ 5.0 .
- 40 11. Composition according to any of the preceding claims comprising a Broensted acid.
12. Composition according to any of the preceding claims in liquid form.
13. Process for preparing the fabric softening composition according to any of the preceding claims by mixing the ingredients whereby the enzyme and the fragrance precursor are added at last.
- 45 14. Process for imparting odor to a fabric by rinsing it with a composition comprising a surfactant as fabric softener, fragrance precursor and an enzyme suitable for cleaving the fragrance precursor.

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European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 00 11 0814

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 649 979 A (PAGET WALTER ET AL) 22 July 1997 (1997-07-22) * column 1, line 50 - column 2, line 66 * * column 5, line 55 - column 6, line 12 *	1-10, 12, 14	C11D3/50 C11D3/386 C11D3/00
D, X	& WO 95 04809 A (FIRMENICH SA) 16 February 1995 (1995-02-16) ---	1-10, 12, 14	
A	EP 0 887 336 A (GIVAUDAN ROURE INT) 30 December 1998 (1998-12-30) * examples 9, 12 * * claims * -----	1-10, 12, 14	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			C11D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30 November 2000	Examiner Richards, M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03 82 (P4/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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