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(54) Title: LIQUID DETERGENT COMPOSITION

(57) Abstract: The present invention provides a liquid detergent composition, comprising: (a) a cleaning effective amount of an enzyme preferably selected from a proteolytic enzyme, an amylolytic enzyme, a lipolytic enzyme, a cellulolytic enzyme and mixtures thereof; (b) from 0.001 to 3% by weight of a perfume composition, not containing a perfume component selected from the group consisting of saturated and unsaturated linear aldehydes, lilial, cyclal c, vanillin, citral, cinnamic aldehyde, pulegone, terpinolene, gamma terpinene, alpha methylionone; (c) from 0.002 to 1% by weight of an antioxidant; and (d) a fatty acid soap in an amount of at most 4% by weight. Said detergent composition was found to have favourable storage stability characteristics.



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Liquid Detergent Composition

Field of the invention

The present invention relates to detergent compositions
5 containing enzymes, wherein the activity of the enzyme has been
stabilised against deterioration (e.g. by degradation of the
enzyme molecule) during storage. The stabilised liquid enzyme-
containing detergent compositions of the invention are
particularly useful in methods for removing proteinaceous soils
10 from fabric substrates, so as to clean those substrates.

Background of the invention

In liquid detergent compositions, especially those for the
washing of textile fabrics, it is common to include one or more
15 enzymes for assisting removal of various kinds of soil. Amongst
these are proteolytic enzymes, often referred to as
"proteases". Proteases are used to assist in the removal of
protein-based soil.

However, the very nature and activity of these enzymes means
20 that they attack any other component in the liquid composition
which has a protein-like structure. As a result, they can
degrade other enzymes in the liquid, as well as undergo self-
degradation. To counteract this, it is usual also to
incorporate an enzyme stabilising system. Such stabilising
25 systems commonly consist of a boron compound, e.g. borax,
together with a polyol, e.g. glycerol or sorbitol. These
components are believed to form an enzyme-inhibiting complex
which dissociates by dilution of the composition into the wash
liquor, disabling the inhibiting effect so that the protease
30 can act upon the proteinaceous soil.

Other protease stabilisers such as calcium chloride/calcium format are also known but are not as effective as those systems based on boron. On the other hand, it may be desirable for environmental reasons to reduce the amount of boron in the
5 detergent composition.

Another type of enzyme stabilising system for use in enzyme-containing liquid detergent compositions is disclosed by US-A-4,238,345. This document discloses that the combination of an
10 antioxidant having a standardised redox potential at least equal to that of ascorbic acid but less than that of sodium hydrosulphite, with hydrophylic polyol is an effective stabilising system for proteolytic enzymes.

15 We have found in this connection that perfumes generally can degrade proteolytic and lipolytic and amylolytic enzymes when also present in liquid detergent compositions. In particular, we have found that some specific perfume components particularly can degrade protease, lipase and amylase enzymes
20 when present in the liquid detergent composition.

In view of this, it is an object of the present invention to provide an effective liquid detergent composition containing both a proteolytic and/or a lipolytic and/or an amylolytic
25 enzyme and a perfume composition, and having favourable storage stability.

We have now surprisingly found that this object can be achieved by applying a perfume composition, whereby various specific perfume components are not present in said composition. In
30 other words, we have found that an enzyme- and perfume-containing liquid detergent composition having favourable storage stability characteristics can be obtained, when various

specific perfume components are not present in the liquid detergent composition.

Definition of the invention

- 5 Accordingly, in one aspect the present invention provides a liquid detergent composition, comprising:
- (a) a cleaning effective amount of an enzyme;
 - (b) from 0.001 to 3% by weight of a perfume composition not
10 containing a perfume component selected from the group consisting of saturated and unsaturated linear aldehydes, lilial, cyclal c, vanillin, citral, cinnamic aldehyde, pulegone, terpinolene, gamma terpinene, alpha methylionone;
 - (c) from 0.002 to 1% by weight of an antioxidant; and
 - 15 (d) a fatty acid soap in an amount of at most 4% by weight.
- Preferably, the enzyme present in the liquid composition of the invention is selected from a proteolytic enzyme, an amylolytic enzyme, a lipolytic enzyme, a cellulolytic enzyme and mixtures thereof.
- 20 Furthermore, in a second aspect the invention provides a method of cleaning a fabric substrate, comprising the steps of treating the substrate with a liquid composition of the present invention in an aqueous environment, rinsing the substrate and
25 drying it.

Detailed description of the invention

The liquid detergent composition

- 30 Liquid detergent compositions generally can be considered either to be isotropic or structured. The liquid cleaning composition may be formulated as a concentrated cleaning liquid for direct application to a substrate, or for application to a

substrate following dilution, such as dilution before or during use of the liquid composition by the consumer or in washing apparatus.

- 5 Whilst the composition and method according to the present invention may be used for cleaning any suitable substrate, the preferred substrate is a laundry fabric. Cleaning may be carried out by simply leaving the substrate in contact for a sufficient period of time with a liquid medium constituted by
10 or prepared from the liquid cleaning composition. Preferably, however, the cleaning medium on or containing the substrate is agitated.

Product form

- 15 The liquid detergent composition according to the present invention is preferably a concentrated liquid cleaning composition. Furthermore, said liquid detergent composition is preferably isotropic.

It should be understood that the liquid compositions according
20 to any aspect of the present invention have a physical form which preferably ranges from a pourable liquid, a pourable gel to a non-pourable gel. These forms are conveniently characterised by the product viscosity. In these definitions, and unless indicated explicitly to the contrary, throughout
25 this specification, all stated viscosity's are those measured at a shear rate of 21 s^{-1} and at a temperature of 25°C .

Pourable liquid compositions according to any aspect of the present invention preferably have a viscosity of no more than
30 1,500 mPa.s, more preferably no more than 1,000 mPa.s, still more preferably, no more than 500 mPa.s.

Compositions according to any aspect of the present invention which are pourable gels, preferably have a viscosity of at least 1,500 mPa.s but no more than 6,000 mPa.s, more preferably no more than 4,000 mPa.s, still more preferably no more than
5 3,000 mPa.s and especially no more than 2,000 mPa.s.

Compositions according to any aspect of the present invention which are non-pourable gels, preferably have a viscosity of at least 6,000 mPa.s but no more than 12,000 mPa.s, more
10 preferably no more than 10,000 mPa.s, still more preferably no more than 8,000 mPa.s and especially no more than 7,000 mPa.s. Liquid detergent compositions according to the invention may be suitably contained in water-soluble packages which are preferably made from polyvinyl alcohol (PVOH) film. If so, then
15 the perfume components which are not included in the liquid detergent composition of the invention may be effectively segregated from said composition by including them in the film material of the water soluble package. Alternatively, a water soluble package may be applied wherein the film encloses at
20 least two containers of which the contents are segregated from each other during storage and wherein the perfume components not contained in the liquid detergent composition of the invention are present in a container which is different and segregated from the container holding the composition of the
25 invention.

Physically stable

For the purpose of this invention a composition is physically stable when less than 2% phase separation occurs after 2 week
30 storage at 37°C. With isotropic liquids this phase separation generally starts with the liquid becoming hazy.

Water

Preferably the amount of water in the liquid detergent composition of the invention is from 5 to 95%, more preferred from 30 to 80%, by weight.

5

Perfume composition

The liquid composition of the present invention comprises between 0.001 to 3 wt/wt % of a perfume composition, preferably between 0.1 to 2 wt/wt % of a perfume composition.

- 10 Said perfume composition of the invention does not contain a perfume component selected from the group consisting of saturated and unsaturated linear aldehydes, lilial, cyclal c, vanillin, citral, cinnamic aldehyde, pulegone, terpinolene, gamma terpinene, alpha methylionone.
- 15 It has been found in this connection that the indicated perfume components have a clearly negative effect on the storage stability of any protease, amylase and lipase enzyme present in the liquid detergent composition of the invention.
- Particular examples of (un)saturated linear aldehydes are
- 20 octanal and tridecylenic aldehyde. These types of linear aldehydes should clearly be excluded from the liquid detergent composition of the invention.

- On the other hand, it has been found that the following perfume
- 25 components do not -or to a much lesser extent- negatively interact with the indicated types of enzyme:
- citronellal, trifernal, precyclemone, hexylcinnamic aldehyde, benzaldehyde, anis aldehyde, vertofix coeur, alpha damascone, iso e super, tetra hydroxylinalool,
- 30 methyl anthranilate, benzyl acetate, rose oxide, peonile, and limonene. It is therefore preferred to apply these perfume components in the perfume composition of the present invention.

Enzymes

"Detergent enzyme", as used herein, means any enzyme having a cleaning, stain removing or otherwise beneficial effect in a laundry application. Enzymes are included in the liquid

5 detergent composition of the present invention for a variety of purposes, including removal of protein-based, saccharide-based, or triglyceride-based stains, for the prevention of refugee dye transfer, and for fabric restoration.

The composition of the invention preferably contains an enzyme
10 selected from the group consisting of a protease, an amylase, a lipase, a cellulase and mixtures thereof. Preferably, said composition contains a protease enzyme and/or an amylase.

Other enzymes which are usually present in liquid detergent compositions, include peroxidases of any suitable origin, such
15 as vegetable, animal, bacterial, fungal and yeast origin.

Preferred selections are influenced by factors such as pH-activity and/or stability optima, thermo-stability, and stability to active detergents, builders and the like. In this respect bacterial or fungal enzymes are preferred, such as
20 bacterial amylases and proteases, and fungal cellulases.

Enzymes are normally incorporated into detergent compositions at levels sufficient to provide a "cleaning-effective amount". The term "cleaning effective amount" refers to any amount
25 capable of producing a cleaning, stain removal, soil removal, whitening, deodorizing, or freshness improving effect on substrates such as fabrics. In practical terms for current commercial preparations, typical amounts are up to about 5 mg by weight, more typically 0.001 mg to 3 mg, of active enzyme
30 per gram of the detergent composition. Stated otherwise, the compositions herein will typically comprise from 0.0001% to 10%, preferably from 0.001% to 5%, more preferably 0.005%-1% by weight of a commercial enzyme preparation.

The Proteolytic Enzyme

Endopeptidases (proteolytic enzymes or proteases) of various qualities and origins and having activity in various pH ranges of from 4-12 are available and can be used in the instant invention. Examples of suitable proteolytic enzymes are the subtilisins, which can be obtained from particular strains of B. subtilis, B. lentus, B. amyloliquefaciens and B. licheniformis, such as the commercially available subtilisins Savinase™, Alcalase™, Relase™, Kannase™ and Everlase™ as supplied by Novo Industri A/S, Copenhagen, Denmark or Purafect™, PurafectOxP™ and Properase™ as supplied by Genencor International. Chemically or genetically modified variants of these enzymes are included such as described in WO-A-99/02632 pages 12 to 16 and in WO-A-99/20727 and also variants with reduced allergenicity as described in WO-A-99/00489 and WO-A-99/49056.

It should be understood that the protease is present in the liquid detergent composition of the invention in a dissolved or dispersed form, i.e., the protease is not encapsulated to prevent the protease from the liquid composition. Instead the protease is more or less in direct contact with the liquid composition.

Suitable examples of proteases are the subtilisins which are obtained from particular strains of B. subtilis and B. licheniformis. One suitable protease is obtained from a strain of Bacillus, having maximum activity throughout the pH range of 8-12, developed and sold as ESPERASE™ by Novo Industries A/S of Denmark, hereinafter "Novo". The preparation of this enzyme and analogous enzymes is described in GB 1,243,784 to Novo. Other suitable proteases include ALCALASE™ and SAVINASE™ from

Novo and MAXATASE™ from International Bio-Synthetics, Inc., The Netherlands; as well as Protease A as disclosed in EP 130,756 A, and Protease B as disclosed in EP 303,761 A and EP 130,756 A. See also a high pH protease from Bacillus sp. NCIMB 5 40338 described in WO 9318140 A to Novo. Enzymatic detergents comprising protease, one or more other enzymes, and a reversible protease inhibitor are described in WO 9203529 A. Other preferred proteases include those of WO 9510591 A. When desired, a protease having decreased adsorption and increased 10 hydrolysis is available as described in WO 9507791. A recombinant trypsin-like protease for detergents suitable herein is described in WO 9425583.

Useful proteases are also described in PCT publications: WO 15 95/30010, WO 95/30011, WO 95/29979.

Preferred proteolytic enzymes are also modified bacterial serine proteases, such as those described in EP-A-251446 (particularly pages 17, 24 and 98), and which is called herein 20 "Protease B", and in EP-A- 199404, which refers to a modified bacterial serine proteolytic enzyme which is called "Protease A" herein, Protease A as disclosed in EP-A-130756.

The preferred liquid laundry detergent compositions according 25 to the present invention comprise at least 0.001% by weight, of a protease enzyme. However, an effective amount of protease enzyme is sufficient for use in the liquid laundry detergent compositions described herein. The term "an effective amount" refers to any amount capable of producing a cleaning, stain 30 removal, soil removal, whitening, deodorizing, or freshness improving effect on substrates such as fabrics. In practical terms for current commercial preparations, typical amounts are up to about 5 mg by weight, more typically 0.001 mg to 3 mg, of

active enzyme per gram of the detergent composition. Stated otherwise, the compositions herein will typically comprise from 0.001% to 5%, preferably 0.01%-1% by weight of a commercial enzyme preparation. Typically, the proteolytic enzyme content is up to 0.2%, preferably from $4 \times 10^{-5}\%$ to 0.06% by weight of the composition of pure enzyme.

Lipolytic enzyme

As outlined above, the present invention also provides the use of a lipase enzyme a combination with a liquid detergent composition comprising a perfume composition, as specified in claim 1, and optionally a protease enzyme.

Said lipase enzyme may be present in the liquid detergent composition of the invention at a level of 10 - 20,000 LU per gram. The lipase enzyme is preferably selected from the group consisting of Lipolase, Lipolase ultra, LipoPrime, Lipomax, Liposam, and lipase from *Rhizomucor miehei* (e.g. as described in EP-A-238 023 (Novo Nordisk)).

A characteristic feature of lipases is that they exhibit interfacial activation. This means that the enzyme activity is much higher on a substrate which has formed interfaces or micelles, than on fully dissolved substrate. Interface activation is reflected in a sudden increase in lipolytic activity when the substrate concentration is raised above the critical micel concentration (CMC) of the substrate, and interfaces are formed. Experimentally this phenomenon can be observed as a discontinuity in the graph of enzyme activity versus substrate concentration. Contrary to lipases, however, cutinases do not exhibit any substantial interfacial activation.

- Suitable lipase enzymes for detergent usage include those produced by microorganisms of the *Pseudomonas* group, such as *Pseudomonas stutzeri* ATCC 19.154, as disclosed in GB 1,372,034. See also lipases in Japanese Patent Application 53,20487. This
- 5 lipase is available from Amano Pharmaceutical Co. Ltd., Nagoya, Japan, under the trade name Lipase P "Amano," or "Amano-P." Other suitable commercial lipases include Amano-CES, lipases ex *Chromobacter viscosum*, e.g. *Chromobacter viscosum* var. *lipolyticum* NRRLB 3673 from Toyo Jozo Co., Tagata, Japan;
- 10 *Chromobacter viscosum* lipases from U.S. Biochemical Corp., U.S.A. and Disoynth Co., The Netherlands, and lipases ex *Pseudomonas gladioli*. LIPOLASE™ enzyme derived from *Humicola lanuginosa* and commercially available from Novo, see also EP 341,947, is a preferred lipase for use herein. Lipase and
- 15 amylase variants stabilized against peroxidase enzymes are described in WO 9414951 A to Novo. See also WO 9205249. Cutinase enzymes suitable for use herein are described in WO 8809367 A to Genencor.
- 20 The lipolytic enzyme suitable for use in the present invention can usefully be added to the detergent composition in any suitable form, i.e. the form of a granular composition, a slurry of the enzyme, or with carrier material (e.g. as in EP-A-258 068 and the Savinase (TM) and Lipolase (TM) products of
- 25 Novozymes). A good way of adding the enzyme to a liquid detergent product is in the form of a slurry containing 0.5 to 50 % by weight of the enzyme in a ethoxylated alcohol nonionic surfactant, such as described in EP-A-450 702 (Unilever).
- 30 **Amylolytic enzymes**
- The present invention also provides the use of an amylase enzyme in a liquid detergent formulation of the invention.

Suitable amylases include those of bacterial or fungal origin. Chemically or genetically modified variants of these enzymes are included as described in WO-A-99/02632 pages 18,19.

Commercial cellulase are sold under the tradename Purastar™,
5 Purastar OxAm™ (formerly Purafact Ox Am™) by Genencor;
Termamyl™, Fungamyl™, Duramyl™, Natalase™, all available from
Novozymes.

Amylases suitable herein include, for example, alfa-amylases
10 described in GB 1,296,839 to Novo; RAPIDASE™, International
Bio-Synthetics, Inc. and TERMAMYL™, Novo. FUNGAMYL™ from Novo
is especially useful.

See, for example, references disclosed in WO 9402597.

Stability-enhanced amylases can be obtained from Novo or from
15 Genencor International. One class of highly preferred amylases
herein have the commonality of being derived using site-
directed mutagenesis from one or more of the Bacillus
amylases, especially the Bacillus cc- amylases, regardless of
whether one, two or multiple amylase strains are the immediate
20 precursors.

Oxidative stability-enhanced amylases vs. the above-identified
reference amylase are preferred for use, especially in
bleaching, more preferably oxygen bleaching, as distinct from
25 chlorine bleaching, detergent compositions herein. Such
preferred amylases include (a) an amylase according to WO
9402597, known as TERMAMYL™,

Particularly preferred amylases herein include amylase variants
30 having additional modification in the immediate parent as
described in WO 9510603 A and are available from the assignee,
Novo, as DURAMYL™. Other particularly preferred oxidative

stability enhanced amylase include those described in WO 9418314 to Genencor International and WO 9402597 to Novo Or WO 9509909 A to Novo.

5 Other enzymes

Other optional suitable enzymes that may be included alone or in combination with any other enzyme may, for example, be oxidoreductases, transferases, hydrolases, lyases, isomerases and ligases. Suitable members of these enzyme classes are
10 described in Enzyme nomenclature 1992: recommendations of the Nomenclature Committee of the International Union of Biochemistry and Molecular Biology on the nomenclature and classification of enzymes, 1992, ISBN 0-12-227165-3, Academic Press.

15

Examples of the oxidoreductases are oxidases such as glucose oxidase, methanol oxidase, bilirubin oxidase, catechol oxidase, laccase, peroxidases such as ligninase and those described in WO-A-97/31090, monooxygenase, dioxygenase such as lipoxygenase
20 and other oxygenases as described in WO-A-99/02632, WO-A-99/02638, WO-A-99/02639 and the cytochrome based enzymatic bleaching systems described in WO-A-99/02641.

Peroxidase enzymes may be used in combination with oxygen
25 sources, e.g., percarbonate, perborate, hydrogen peroxide, etc., for "solution bleaching" or prevention of transfer of dyes or pigments removed from substrates during the wash to other substrates present in the wash solution. Known peroxidases include horseradish peroxidase, ligninase, and
30 haloperoxidases such as chloro- or bromo- peroxidase.

A range of enzyme materials and means for their incorporation into synthetic detergent compositions is also disclosed in WO

9307263 A and WO 9307260 A to Genencor International, WO 8908694 A to Novo, and U.S. 3,553,139, January 5, 1971 to McCarty et al.

- 5 A process for enhancing the efficacy of the bleaching action of oxidoreductases is by targeting them to stains by using antibodies or antibody fragments as described in WO-A-98/56885. Antibodies can also be added to control enzyme activity as described in WO-A-98/06812.

10

Suitable cellulases include those of bacterial or fungal origin. Chemically or genetically modified variants of these enzymes are included as described in WO-A-99/02632 page 17. Particularly useful cellulases are the endoglucanases such as
15 the EGIIII from *Trichoderma longibrachiatum* as described in WO-A-94/21801 and the E5 from *Thermomonospora fusca* as described in WO-A-97/20025. Endoglucanases may consist of a catalytic domain and a cellulose binding domain or a catalytic domain only. Preferred cellulolytic enzymes are sold under the
20 tradename Carezyme™, Celluzyme™ and Endolase™ by Novo Nordisk A/S; Puradax™ is sold by Genencor and KAC™ is sold by Kao corporation, Japan.

Detergent enzymes are usually incorporated in an amount of
25 0.00001% to 2%, and more preferably 0.001% to 0.5%, and even more preferably 0.005% to 0.2% in terms of pure enzyme protein by weight of the composition. Detergent enzymes are commonly employed in the form of granules made of crude enzyme alone or in combination with other components in the detergent
30 composition. Granules of crude enzyme are used in such an amount that the pure enzyme is 0.001 to 50 weight percent in the granules. The granules are used in an amount of 0.002 to 20 and preferably 0.1 to 3 weight percent. Granular forms of

detergent enzymes are known as Enzoguard™ granules, prills, marumes or T-granules. Other suitable forms of enzymes are liquid forms such as the "L" type liquids from Novo Nordisk, slurries of enzymes in nonionic surfactants such as the "SL" type sold by Novo Nordisk and microencapsulated enzymes marketed by Novo Nordisk under the tradename "LDP" and "CC".

The enzymes can be added as separate single ingredients (prills, granulates, stabilised liquids, etc. containing one enzyme) or as mixtures of two or more enzymes (e.g. cogranulates). Enzymes in liquid detergents can be stabilised by various techniques as for example disclosed in US-A-4 261 868 and US-A-4 318 818.

The detergent compositions of the present invention may additionally comprise one or more biologically active peptides such as swollenin proteins, expansins, bacteriocins and peptides capable of binding to stains.

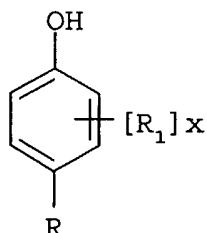
20 Antioxidant

The liquid detergent composition of the invention comprises from 0.002 to 1% by weight of an antioxidant so as to further increase the storage stability of the liquid composition of the invention. Preferably, the antioxidant is present at a concentration in the range of from 0.004 to less than 0.08% by weight. This low concentration range of the antioxidant is most preferred for economical reasons and because the risk of discoloration of the treated fabric is reduced when applying such low antioxidant contents.

30

Antioxidants are substances as described in Kirk-Othmers (Vol 3, pg 424) and in Uhlmanns Encyclopedia (Vol 3, pg 91).

A preferred class of antioxidants suitable for use in the present invention is alkylated phenols having the general formula:



- 5 wherein R is C1-C22 linear or branched alkyl, preferably methyl or branched C3-C6 alkyl; C3-C6 alkoxy, preferably methoxy; R1 is a C3-C6 branched alkyl, preferably tert-butyl; x is 1 or 2. Hindered phenolic compounds are a preferred type of alkylated
- 10 phenols having this formula. A preferred hindered phenolic compound of this type is 2,6-di-tert-butyl-hydroxy-toluene (BHT). Another preferred type of antioxidant is 1,2-benzisothiazoline-3-one (Proxel GXL™).
- 15 Other suitable antioxidants are derivatives of α -tocopherol, beta-tocopherol, gamma-tocopherol, delta-tocopherol, 6-hydroxy-2,5,7,8-tetra-methylchroman-2-carboxylic acid (Trolox™). Anti-oxidants/radical scavengers such as tocopherol sorbate, other esters of tocopherol, butylated hydroxy benzoic acids and
- 20 their salts, gallic acid and its alkyl esters, especially propyl gallate, uric acid and its salts and alkyl esters, sorbic acid and its salts, the ascorbyl esters of fatty acids, amines (e.g. N,N-diethylhydroxylamine, amino-guanidine, amine alcohols), sulfhydryl compounds (e.g., glutathione), and
- 25 dihydroxy fumaric acid and its salts may also be used.

Non-limiting examples of anti-oxidants suitable for use in the present invention include phenols, *inter alia* 2,6-di-tert-butylphenol, 2,6-di-tert-butyl-4-methylphenol, mixtures of 2

and 3- tert-butyl-4-methoxyphenol, and other ingredients including include propyl gallate, tert- butylhydroquinone, benzoic acid derivatives such as methoxy benzoic acid, methylbenzoic acid, dichloro benzoic acid, dimethyl benzoic acid, 5-hydroxy-2,2,4,6,7- pentamethyl-2,3-dihydro-1-benzofuran-3-one, 5-hydroxy-3-methylene-2,2,4,6,7-pentamethyl-2,3-dihydro-benzofuran, 5-benzyloxy-3-hydroxymethyl-2,2,4,6,7-pentamethyl-2,3-dihydro-1-benzofuran, 3-hydroxymethyl-5-methoxy-2,2,4,6,7-pentamethyl-2,3-dihydro-1-benzofuran, vitamin C(ascorbic acid), and Ethoxyquine (1,2-dihydro-6-ethoxy-2,2,4-trimethylchinolin) marketed under the name Raluquin™ by the company Raschig™.

Highly preferred antioxidants for use herein include 2,6-di-tert-butyl hydroxy toluene (BHT), α -tocopherol, ethoxyquine, 2,2,4-trimethyl-1,2-dihydroquinoline, 2,6-di-tert-butyl hydroquinone, 2-tert-butyl hydroquinone, tert-butyl-hydroxy anisole, lignosulphonic acid, 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid (Trolox™), 1,2-benzisothiazoline-3-one and salts thereof.

The most preferred types of antioxidant are 2,6-di-tert-butyl-hydroxy-toluene (BHT), α -tocopherol, 1,2-benzisothiazoline-3-one (Proxel GXL™), 6-hydroxy-2,5,7,8-tetra-methylchroman-2-carboxylic acid (Trolox™), salts thereof and mixtures thereof.

Fatty acid soap

In order to further increase the storage stability of the liquid detergent composition of the invention, said composition comprises a fatty acid soap, said soap preferably being of increased saturation. The extent of saturation of the fatty acid is expressed in terms of iodine value: the lower the iodine value, the higher the degree of saturation. Desirably,

the fatty acid soap has a iodine value lower than 1.0, more preferably lower than 0.3.

In this connection, the iodine value of the fatty acid soap is defined as the weight of halogens expressed as iodine absorbed by 100 parts by weight of fatty acid soap. It follows that a lower iodine value will be measured if the level of saturation of the fatty acid soap will be higher.

The iodine value is determined by the Wijs' method described by IFFO (ISO 3961:1996, May 1998) in which the test sample is dissolved in a solvent and Wijs' reagent added. After about one hour reaction time, potassium iodide and water are added to the mixture. Iodine liberated by the process is titrated with sodium thiosulphate solution.

15

Preferably, the fatty acid soap has a degree of saturation of more than 95%, said degree of saturation being most preferably 100%.

Reason is that such saturated fatty acid soaps have been found to perform favourably for improving storage stability of the enzyme present in the liquid detergent composition of the invention.

Good results with respect to this storage stability were obtained when the fatty acid contained in the soap is a mixture of lauric acid, myristic acid, palmitic acid, stearic acid, arachidic acid, and behenic acid.

It will be recognised that the fatty acid soaps optionally used in the composition of the invention, consist of a fatty acid and a cation. Suitable cations include, sodium, potassium, ammonium, monoethanol ammonium diethanol ammonium, triethanol ammonium, tetraalkyl ammonium, e.g., tetra methyl ammonium up to tetradecyl ammonium etc. cations.

The level of the fatty acid soap in the liquid composition of the invention is at most 4% by weight, preferably at most 2% by weight based on the full liquid composition of the invention.

5

Surfactant

The liquid composition of the invention may comprise from 1 to 90%, preferably from 10 to 70% by weight of a surfactant, preferably selected from anionic, nonionic, cationic,
10 zwitterionic active detergent materials or mixtures thereof. Preferably, the compositions herein comprise 12 to 60% by weight of surfactant, more preferably 15 to 40% by weight.

Non-limiting examples of surfactants useful herein typically at
15 levels from about 10 % to about 70%, by weight, include the conventional C₁₁-C₁₈ alkylbenzene sulphonates ("LAS"), the C₁₀-C₁₈ secondary (2,3) alkyl sulphates of the formula CH₃(CH₂)_x(CHOSO₃-M⁺)CH₃ and CH₃(CH₂)_y(CHOSO₃-M⁺)CH₂CH₃ where x and (y + 1) are integers of at least about 7, preferably at least about 9, and
20 M is a water-solubilising cation, especially sodium, unsaturated sulphates such as oleyl sulphate, C₁₀-C₁₈ alkyl alkoxy carboxylates (especially the EO 1-7 ethoxycarboxylates), the C₁₀-C₁₈ glycerol ethers, the C₁₀-C₁₈ alkyl polyglycosides and their corresponding sulphated polyglycosides, and C₁₂-C₁₈ alpha-
25 sulphonated fatty acid esters. If desired, the conventional nonionic and amphoteric surfactants such as the C₁₂-C₁₈ alkyl ethoxylates ("AE") including the so-called narrow peaked alkyl ethoxylates and C₆-C₁₂ alkyl phenol alkoxyates (especially ethoxylates and mixed ethoxy/propoxy), C₁₂-C₁₈ betaines and
30 sulphobetaines ("sultaines"), C₁₀-C₁₈ amine oxides, and the like, can also be included in the overall compositions. The C₁₀-C₁₈ N-alkyl polyhydroxy fatty acid amides can also be used. Typical examples include the C₁₂-C₁₈ N-methylglucamides. See WO-

92/06,154. Other sugar-derived surfactants include the N-alkoxy polyhydroxy fatty acid amides, such as C₁₀-C₁₈ N-(3 - methoxypropyl) glucamide. C₁₀-C₂₀ conventional soaps may also be used. If high sudsing is desired, the branched-chain C₁₀-C₁₆ soaps may be used.

Mixtures of anionic and nonionic surfactants are especially useful. Other conventional useful surfactants are listed in standard texts.

10

Other anionic surfactants useful for deterative purposes can also be included in the liquid compositions hereof. These can include C₈-C₂₂ primary or secondary alkanesulphonates, C₈-C₂₄ olefinsulphonates, sulphonated polycarboxylic acids, alkyl glycerol sulphonates, fatty acyl glycerol sulphonates, fatty oleyl glycerol sulphates, alkyl phenol ethylene oxide ether sulphates, paraffin sulphonates, alkyl phosphates, isothionates such as the acyl isothionates, N-acyl taurates, fatty acid amides of methyl tauride, alkyl succinamates and sulphosuccinates, monoesters of sulphosuccinate (especially saturated and unsaturated C₁₂-C₁₈ monoesters) diesters of sulphosuccinate (especially saturated and unsaturated C₆-C₁₄ diesters), N-acyl sarcosinates, sulphates of alkylpolysaccharides such as the sulphates of alkylpolyglucoside, branched primary alkyl sulphates, alkyl polyethoxy carboxylates such as those of the formula $RO(CH_2CH_2O)_kCH_2COO-M^+$ wherein R is a C₈-C₂₂ alkyl, k is an integer from 0 to 10, and M is a soluble salt-forming cation, and fatty acids esterified with isethionic acid and neutralised with sodium hydroxide. Further examples are given in Surface Active Agents and Detergents (Vol. I and II by Schwartz, Perry and Berch).

30

Alkyl alkoxyated sulphate surfactants are another category of preferred anionic surfactant. These surfactants; are water soluble salts or acids typically of the formula $RO(A)_mSO_3M$ wherein R is an unsubstituted $C_{10}-C_{24}$ alkyl or hydroxyalkyl group having a $C_{10}-C_{24}$ alkyl component, preferably a $C_{12}-C_{20}$ alkyl or hydroxyalkyl, more preferably $C_{12}-C_{18}$ alkyl or hydroxyalkyl, A is an ethoxy or propoxy unit, m is greater than zero, typically between about 0.5 and about 6, more preferably between about 0.5 and about 3, and M is hydrogen or a water soluble cation which can be, for example, a metal cation (e.g., sodium, potassium, lithium, calcium, magnesium, etc.), ammonium or substituted-ammonium cation. Alkyl ethoxylated sulphates as well as alkyl propoxylated sulphates are contemplated herein.

Specific examples of substituted ammonium cations include methyl-, dimethyl-, trimethyl-ammonium and quaternary ammonium cations, such as tetramethyl-ammonium, dimethyl piperdinium and cations derived from alkanolamines, e.g., monoethanolamine, diethanolamine, and triethanolamine, and mixtures thereof.

Exemplary surfactants are $C_{12}-C_{18}$ alkyl polyethoxylate (1.0) sulphate, $C_{12}-C_{18}$ alkyl polyethoxylate (2.25) sulphate, $C_{12}-C_{18}$ alkyl polyethoxylate (3.0) sulphate, and $C_{12}-C_{18}$ alkyl polyethoxylate (4.0) sulphate wherein M is conveniently selected from sodium and potassium.

25

The liquid detergent compositions of the present invention preferably comprise at least about 5%, preferably at least 10%, more preferably at least 12% and less than 70%, more preferably less than 60% by weight, of an anionic surfactant.

30

Preferred nonionic surfactants such as $C_{12}-C_{18}$ alkyl ethoxylates ("AE") including the so-called narrow peaked alkyl ethoxylates and C_6-C_{12} alkyl phenol alkoxyates (especially

ethoxylates and mixed ethoxy/propoxy), block alkylene oxide condensate of C₆ to C₁₂ alkyl phenols, alkylene oxide condensates of C₈-C₂₂ alkanols and ethylene oxide/propylene oxide block polymers (Pluronic™-BASF Corp.), as well as semi polar
5 nonionics (e.g., amine oxides and phosphine oxides) can be used in the present liquid compositions. An extensive disclosure of these types of surfactants is found in U.S. Patent 3,929,678.

Alkylpolysaccharides such as disclosed in U.S. Patent 4,565,647
10 are also preferred nonionic surfactants in the liquid compositions of the invention.

Further preferred nonionic surfactants are the polyhydroxy fatty acid amides.

A particularly desirable surfactant of this type for use in the
15 liquid compositions herein is alkyl-N-methyl glucamide.

Other sugar-derived surfactants include the N-alkoxy polyhydroxy fatty acid amides, such as C₁₀-C₁₈ N-(3-methoxypropyl) glucamide. The N-propyl through N-hexyl C₁₂-C₁₈
20 glucamides can be used for low sudsing. C₁₀-C₂₀ conventional soaps may also be used. If high sudsing is desired, the branched-chain C₁₀-C₁₆ soaps may be used.

The liquid detergent compositions of the present invention
25 preferably comprise at least about 5%, preferably at least 10%, more preferably at least 12% and less than 70%, more preferably less than 60% by weight, of a nonionic surfactant.

Carriers

30 Liquid detergent compositions of the invention may contain various solvents as carriers.

Low molecular weight primary or secondary alcohols exemplified by methanol, ethanol, propanol, and isopropanol are suitable. Other suitable carrier materials are glycols, such as mono-, di-, tri-propylene glycol, glycerol and polyethylene glycols
5 (PEG) having a molecular weight of from 200 to 5000.

The compositions may contain from 1% to 50%, typically 5% to 30%, preferably from 2% to 10%, by weight of such carriers.

Detergency builders

10 One or more detergency builders may be suitably present in the liquid detergent composition of the invention.

Examples of suitable organic detergency builders, when present, include the alkaline metal, ammonium and substituted ammonium
15 polyacetates, carboxylates, polycarboxylates, polyacetyl carboxylates, carboxymethyloxysuccinates, carboxymethyloxymalonates, ethylene diamine-N,N-disuccinic acid salts, polyepoxysuccinates, oxydiacetates, triethylene tetramine hexa-acetic acid salts, N-alkyl imino diacetates or
20 dipropionates, alpha sulpho- fatty acid salts, dipicolinic acid salts, oxidised polysaccharides, polyhydroxysulphonates and mixtures thereof.

Specific examples include sodium, potassium, lithium, ammonium
25 and substituted ammonium salts of ethylenediamino-tetraacetic acid, nitrilo-triacetic acid, oxydisuccinic acid, melitic acid, benzene polycarboxylic acids and citric acid, tartrate mono succinate and tartrate di succinate.

Other optional ingredients

The compositions herein can further comprise a variety of optional ingredients. A wide variety of other ingredients useful in detergent compositions can be included in the

compositions herein, including other active ingredients, hydrotropes, processing aids, dyes or pigments, solid fillers for bar compositions, etc.

- 5 If high sudsing is desired, suds boosters such as the C₁₀-C₁₆ alkanolamides can be incorporated into the compositions, typically at 1%- 10% levels. The C₁₀-C₁₄ monoethanol and diethanol amides illustrate a typical class of such suds boosters. If desired, soluble magnesium salts such as MgCl₂,
10 MgSO₄, and the like, can be added at levels of, typically, 0.1%-2%, to provide additional suds and to enhance grease removal performance.

Chelating Agents

- 15 The liquid detergent compositions herein may also optionally contain one or more iron, copper and/or manganese chelating agents. Such chelating agents can be selected from the group consisting of amino carboxylates, amino phosphonates, polyfunctionally- substituted aromatic chelating agents and
20 mixtures therein, all as hereinafter defined.

If utilised, these chelating agents will generally comprise from about 0.1% to about 10% by weight of the detergent compositions herein. More preferably, if utilised the chelating
25 agents will comprise from about 0.1% to about 3.0% by weight of such compositions.

- Suitable types of phosphonates for use as chelating agents in the composition of the invention are ethylene diamine
30 tetramethylene phosphonate and diethylene triamine pentamethylene phosphonate.

Suitable examples of carboxylates for use as chelating agents are ethylene diamine disuccinate (EDDS), ethylene diamine tetraacetate (EDTA), diethylene triamine pentaacetic acid (DTPA), and imino disuccinic acid (IDS).

5

Clay Soil Removal/Anti-redeposition Agents

The compositions of the present invention can also optionally contain water- soluble ethoxylated amines having clay soil removal and antiredeposition properties.

10 Liquid detergent compositions typically contain about 0.0 1% to about 5% of these agents.

One preferred soil release and anti-redeposition agent is ethoxylated tetraethylenepentamine. Exemplary ethoxylated
15 amines are further described in U.S. Patent 4,597,898,

Other types of preferred antiredeposition agent include the carboxy methyl cellulose (CMC) materials. These materials are well known in the art.

20

Brightener

Any optical brighteners or other brightening or whitening agents known in the art can be incorporated at levels typically from about 0.05% to about 1.2%, by weight, into the liquid
25 detergent compositions herein. Commercial optical brighteners which may be useful in the present invention can be classified into subgroups, which include, but are not necessarily limited to, derivatives of stilbene, pyrazoline, coumarin, carboxylic acid, methinecyanines, dibenzothiphen-5,5-dioxide, azoles, 5-
30 and 6-membered- ring heterocycles, and other miscellaneous agents. Examples of such brighteners are disclosed in "The Production and Application of Fluorescent Brightening Agents", M. Zahradnik, Published by John Wiley & Sons, New York (1982).

Suds Suppressors

Compounds for reducing or suppressing the formation of suds can be incorporated into the compositions of the present invention.

5 Suds suppression can be of particular importance in the so-called "high concentration cleaning process" as described in U.S. 4,489,455 and 4,489,574 and in front-loading European-style washing machines.

10 A wide variety of materials may be used as suds suppressors, and suds suppressors are well known to those skilled in the art. See, for example, Kirk Othmer Encyclopedia of Chemical Technology, Third Edition, Volume 7, pages 430- 447 (John Wiley & Sons, Inc., 1979). One category of suds suppressor of
15 particular interest encompasses monocarboxylic fatty acid and soluble salts therein. See U.S. Patent 2,954,347. The monocarboxylic fatty acids and salts thereof used as suds suppressor typically have hydrocarbyl chains of 10 to about 24 carbon atoms, preferably 12 to 18 carbon atoms. Suitable salts
20 include the alkali metal salts such as sodium, potassium, and lithium salts, and ammonium and alkanolammonium salts.

The detergent compositions herein may also contain non-surfactant suds suppressors. These include, for example: high
25 molecular weight hydrocarbons such as paraffin, fatty acid esters (e.g., fatty acid triglycerides), fatty acid esters of monovalent alcohols, aliphatic C 18-C40 ketones (e.g., stearone), etc.

30 Fabric Softeners

Various through-the-wash fabric softeners, especially the impalpable smectite clays of U.S. Patent 4,062,647 as well as other softener clays known in the art, can optionally be used

typically at levels of from about 0.5% to about 10% by weight in the present compositions to provide fabric softener benefits concurrently with fabric cleaning. Clay softeners can be used in combination with amine and cationic softeners as disclosed, 5 for example, in U.S. Patent 4,375,416 and U.S. Patent 4,291,071.

Dye Transfer Inhibiting Agents

The compositions of the present invention may also include one 10 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 include polyvinyl pyrrolidone polymers, polyamine N-oxide polymers, copolymers of N-vinylpyrrolidone and N-vinylimidazole, 15 manganese phthalocyanine, peroxidases, and mixtures thereof. If used, these agents typically comprise from about 0.01% to about 10% by weight of the composition, preferably from about 0.01% to about 5%, and more preferably from about 0.05% to about 2%.

20 Bleaches

The liquid detergent composition of the present invention may also comprise bleaching material.

Particularly preferred bleaching ingredients are those capable 25 of yielding hydrogen peroxide in aqueous solution, the so-called peroxy species. Hydrogen peroxide sources are well known in the art. They include the alkali metal peroxides, organic peroxides such as urea peroxide and PAP (N,N-phthaloylaminoperoxy caproic acid), and inorganic persalts, 30 such as the alkali metal perborates, percarbonates, perphosphates, persilicates and persulphates. Mixtures of two or more such compounds may also be suitable.

Particularly preferred types of H_2O_2 -sources are sodium perborate tetrahydrate and, especially, sodium perborate monohydrate. Sodium perborate monohydrate is preferred because
5 of its high active oxygen content. Sodium percarbonate may also be preferred for environmental reasons. The amount thereof in the composition of the invention usually will be within the range of about 1-35% by weight, preferably from 5-25% by weight. One skilled in the art will appreciate that these
10 amounts may be reduced in the presence of a bleach precursor e.g., N,N,N',N'-tetraacetyl ethylene diamine (TAED), SNOBS (sodium nonanoyloxybenzene sulfonate) and NACOBS ((6-nonamidocaproyl) oxybenzene sulfonate). When used, the bleach precursors generate peroxyacids after reaction with hydrogen
15 peroxide. Alternatively, peracids, as such, for instance PAP (N,N-phthaloylaminoperoxy caproic acid), may be employed. Cationic nitriles may also be used to activate peroxy species.

Alternatively or in addition to, a transition metal catalyst
20 may used with the peroxy species, see, for example WO-02/48301. A transition metal catalyst may also be used in the absence of peroxy species where the bleaching is termed to be via atmospheric oxygen, see, for example WO-00/52124 and WO-02/48301. The transition metal catalysts disclosed in WO-
25 00/52124 and WO-02/48301 are generally both applicable to what is known in the art as "air mode" and "peroxy mode" bleaching. Another example of a suitable class of transition metal catalysts is found in WO-02/48301 and references found therein.

30 If a peroxygen bleach is present in the composition the presence of a transition metal chelating agent is preferred to stabilise the peroxygen bleach.

Photobleaches, including singlet oxygen photobleaches, may also be used in the liquid detergent composition of the invention.

5 When the composition is in the form of a liquid, segregation of various components may be necessary and these will be evident to one skilled in the art. One form of segregation that is preferred is that of coacervation. The use of pH-Jump compositions and antioxidants are also applicable to preserving
10 the integrity of certain components within the composition.

Since many bleaches and bleach systems are unstable in aqueous liquid detergents and/or interact unfavourably with other components in the composition, e.g. enzymes, they may for
15 example be protected, e.g. by encapsulation or by formulating a structured liquid composition, whereby they are suspended in solid form.

Another suitable form of segregation is that of coacervation. The use of a pH-jump system may also be desirable for
20 preserving the integrity of certain components within the liquid composition of the invention.

The invention will now be illustrated by way of the following non-limiting examples, in which all parts and percentages are
25 by weight unless otherwise indicated.

EXAMPLES

The following 'base' liquid detergent formulation was prepared:

5	Ingredient	% by weight
	LAS acid	4.5
	SLES 3EO	4.5
	NI 7EO	4.5
	Proxel GXL	0.016
10	Sorbitol	3.3
	Borax.10H ₂ O	2.3
	MPG	4.7
	NaOH	0.75
	Prifac 7908	1.0
15	Protease enzyme	0.4
	Water	balance to 100

Wherein:

LAS acid = C₁₀-C₁₄ alkyl benzene sulphonic acid;

20 SLES = sodium lauryl ether sulphate (with on average 3 ethylene oxide groups);

NI 7EO = C₁₂-C₁₃ fatty alcohol ethoxylated with an average of 7 ethylene oxide groups;

MPG = monopropylene glycol;

25 Prifac 7908 = palmkernel fatty acid

Proxel GXL - biocide (20% active)

To various samples of this 'base' liquid formulation 0.06% by weight based on said formulation of several types of perfume components were added as indicated in the tables below, whereby Table 1 shows experimental results for compositions containing perfume components according to the present invention whereas Table 2 shows experimental results for compositions with

perfume components which are outside the scope of the present invention.

The residual activity of the protease enzyme in all thus-formed
5 formulations after 2 weeks storage at 37°C, was determined at
40°C in a TRIS pH 9 buffer and using tetrapeptide as substrate.
For this determination, the following protocol was used:
Samples of 70 mg of the tested liquid formulation were diluted
in 10.00 ml MilliQ water. 10 µl of this solution was added to
10 an assay of 205 µl containing 74.4 mM TRIS pH9 and 0.494 mM
tetrapeptide (succinyl-Ala-Ala-Pro-Phe-p-Nitroanilide).
The absorbance of the tested samples at a wavelength of 450 nm
was measured for 15 minutes at 40°C, using a spectrophotometer.
The absolute changes in absorbance as compared to the
15 absorbance measured on a freshly prepared calibration sample
were correlated to the measured activity of such freshly
prepared sample. The measured protease enzyme activity is
expressed as GU/ml.
The residual enzyme activity (expressed as %) is the enzyme
20 activity after storage of the liquid formulation concerned
divided by the enzyme activity measured at t=0.
Tables 1 and 2 show the residual enzyme activity in liquid
detergent formulations according to the present invention
respectively outside the scope of the invention.
25 It can be clearly derived from these tables that the residual
activity of the protease enzyme present in the liquid
compositions of the invention is significantly higher than in
the liquid compositions outside the scope of the invention.

Table 1

	Perfume component	Residual activity after 2 weeks
	-none-	66
	Citronellal	62
5	Trifernal	74
	Pre-cycle-mone	74
	Hexylcinnamic aldehyde	81
	Benzaldehyde	67
	Anis aldehyde	75
10	Vertofix coeur	68
	Alpha damascone	68
	Iso e super	75
	Tetra hydro-linalool	65
	Methyl anthranilate	70
15	Benzyl acetate	69
	Rose oxide	60
	Peonile	73
	Limonene	60

20 **Table 2**

	Perfume component	Residual activity after 2 weeks
	Lilial	48
	Octanal	44
	Cyclal C	45
25	Tridecylenic aldehyde	45
	Citral	36
	Vanillin	43
	Cinnamic aldehyde	58
	Pulegone	58
30	Terpinolene	47
	Gamma terpinolene	54

Claims

1. A liquid detergent composition, comprising:
 - (a) a cleaning effective amount of an enzyme;
 - (b) from 0.001 to 3% by weight of a perfume composition, not containing a perfume component selected from the group consisting of saturated and unsaturated linear aldehydes, lilial, cyclal c, vanillin, citral, cinnamic aldehyde, pulegone, terpinolene, gamma terpinene, and alpha methylionone;
 - (c) from 0.002 to 1% by weight of an antioxidant; and
 - (d) a fatty acid soap in an amount of at most 4% by weight.
2. A liquid detergent composition according to claim 1, wherein the enzyme is selected from the group consisting of a proteolytic enzyme, an amylolytic enzyme, a lipolytic enzyme, a cellulolytic enzyme and mixtures thereof.
3. A liquid composition according to claim 1 or claim 2, wherein the perfume composition is present at a concentration of 0.1 to 2% by weight.
4. A liquid composition according to any of claims 1-3, wherein the enzyme is a proteolytic enzyme.
5. A liquid composition according to any of claims 1-4, wherein the antioxidant has a concentration in the range of from 0.004 to 0.08% by weight.
6. A liquid composition according to any of claims 1-5, wherein the antioxidant is selected from the group consisting of 2,6-di-tert-butyl-hydroxy-toluene (BHT), alpha-tocopherol,

ethoxyquine, 2,2,4-trimethyl-1,2-dihydroquinoline, 2,6-di-tert-butyl-hydroquinone, 2-tert-butyl-hydroquinone, tert-butyl-hydroxy anisole, lignosulphonic acid, 6-hydroxy-2,5,7,8-tetra-methylchroman-2-carboxylic acid (TroloxTM), 1,2-benzisothiazoline-3-one (Proxel GXLTM) and salts thereof.

7. A liquid composition according to claim 6, wherein the antioxidant is selected from the group consisting of 2,6-di-tert-butyl-hydroxy-toluene (BHT), α -tocopherol, 6-hydroxy-2,5,7,8-tetra-methylchroman-2-carboxylic acid (TroloxTM), 1,2-benzisothiazoline-3-one (Proxel GXLTM), salts thereof and mixtures thereof.
8. A liquid composition according to any of claims 1-7, wherein the fatty acid soap has an iodine value lower than 1.0, preferably lower than 0.3.
9. A liquid composition according to claim 8, wherein the fatty acid contained in said soap is a mixture of lauric acid, myristic acid, palmitic acid, stearic acid, linolenic acid, arachidonic acid, and behenic acid.
10. A liquid composition according to any of claims 1-9, wherein the composition comprises water in an amount of from 30 to 80% by weight.
11. A method of cleaning a fabric substrate, comprising the steps of treating the substrate with a liquid composition as defined in any preceding claim in an aqueous environment, rinsing the substrate and drying it.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP2005/009888

A. CLASSIFICATION OF SUBJECT MATTER
C11D3/386 C11D3/50

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 practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97/43388 A (THE PROCTER & GAMBLE COMPANY) 20 November 1997 (1997-11-20) page 21, lines 32-34; examples -----	1-11
X	US 2004/077520 A1 (FOLEY PETER ROBERT ET AL) 22 April 2004 (2004-04-22) paragraphs '0058!, '0138!, '0152!, '0171!, '0173!; examples -----	1-11
X	US 5 445 747 A (KVIETOK ET AL) 29 August 1995 (1995-08-29) column 15, line 47 - column 17, line 6; claims; examples -----	1-11
X	WO 93/04158 A (THE PROCTER & GAMBLE COMPANY) 4 March 1993 (1993-03-04) claims; examples II-VII, IX-XI ----- -/-	1-11

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

Int. Patent Application No.

PCT/EP2005/009888

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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