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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))

(54) Title: PRESERVED CLEANING COMPOSITIONS

(57) Abstract: The present invention relates to a liquid detergent composition comprising a non-ionic surfactant; a short chain (C1 to C6), unsaturated, organic acid or salt thereof having at least two carboxyl groups, and to a method of preparing such a composition and to the use of such a composition.



WO 2020/109022 A1

PRESERVED CLEANING COMPOSITIONS

Field of the Invention

- 5 The present invention relates to the area of preservation chemicals for liquid detergent compositions, in particular to liquid detergent compositions for cleaning hard surfaces. leaning compositions.

Background

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In the cleaning industry, there is a constant need for preservation chemicals, especially preservation chemicals that are from natural sources, that are abundant and readily available.

- 15 A large number of antimicrobial active compounds are already employed in the cleaning compositions, but alternatives are continually sought after. Not all antimicrobial agents have adequate preservation properties and thus the new for new preservation chemicals is particularly required. It is noted that substances used in the domestic cleaning compositions for domestic use must be:

- 20 - Toxicologically acceptable
- Readily tolerated by the skin in case of skin contact via e.g. splashes
- Stable
- Largely and preferably completely odourless
- inexpensive to prepare (i.e. employing standard processes and/or starting from
25 standard precursors)
- easy to formulate (i.e. preferably liquid) and should not be detrimental to the final product.

- 30 The present inventors have found a preservation chemical suitable for use with cleaning compositions in particular to hard surface cleaning compositions.

Description of the Invention

- 35 The present invention relates to a liquid detergent composition comprising:
a) 1 to 50% by weight of a non-ionic surfactant,

- b) 0.1 to 5% by weight of a preservation system comprising a short chain (C₁ to C₆), unsaturated, organic acid or salt thereof having at least two carboxyl groups,
 - c) water; and
- 5 wherein the non-ionic surfactant provides at least 90 wt.% of the total amount by weight of surfactant contained in the composition;
wherein the short chain unsaturated organic acid is itaconic acid or salt thereof.

The invention further relates to a method of preserving a composition as defined herein
10 by the use of; a short chain (C₁ to C₆), unsaturated, organic acid or salt thereof having at least two carboxyl groups.

Detailed Description of the Invention

15 Compositions of the invention comprise a short chain (C₁ to C₆), unsaturated, organic acid or salt thereof. The organic acid comprises two carboxyl groups. The unsaturation occurs on a side chain. The organic acid is itaconic acid or salt thereof.

Preferably the total level of short chain (C₁ to C₆), unsaturated, organic acid or salt
20 thereof, in particular itaconic acid in the total composition is from 0.05 to 7 wt% of the total composition, more preferably 0.1 to 5 wt% most preferably from 0.2 to 3 wt%.
Preferably, the composition comprises at least 0.5% by weight of itaconic acid.

The non-ionic surfactant is preferably selected from the group consisting of primary
25 alcohol ethoxylates, secondary alcohol ethoxylates, alkylphenol ethoxylates, alkylaminoalkoxylates ethylene-oxide-propylene oxide condensates on primary alkanols, tertiary amino oxides and alkylpolyglycosyls.

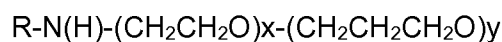
Suitable alcohol ethoxylates are preferably selected from the NEODOL type (Shell),.
30 Suitable NEODOL alcohol ethoxylates are NEODEL 91 (C₉-C₁₁ alcohols), NEODOL 23 (C₁₂-C₁₃ alcohols), NEODOL 25 (C₁₂-C₁₅ alcohols), NEODOL 45 (C₁₄-C₁₅ alcohols), NEODOL 135 (C₁₁-C₁₃-C₁₅ alcohols), NEODOL 1, (C₁₁ alcohol), NEODOL 3, (C₁₃ alcohol), and NEODOL 5, (C₁₅ alcohol).

35 Further suitable are preferably linear- and methyl-branched SAFOL type alcohol ethoxylates. The alcohol consists of approximately 55% C₁₂ and 45% C₁₃ carbon

chain isomers. The alcohol derivatizes like highly linear alcohol and consists of approximately 50% linear and 50% branched isomers. Monobranched alcohols such as, ISALCHEM type alcohol ethoxylates, consist of a set of structural isomers which are all branched in the 2-alkyl position. Products in the range of C11 to C14/C15 are available from SASOL. ISOFOL alcohols are single isomer products available from C12 up to C32, from SASOL.

Yet further suitable alcohol ethoxylates are preferably selected from Imbentin alcohol ethoxylates (KOLB AG) and Lutensol TDA 10 (BASF), which is a 10-mole ethylene oxide adduct of tridecyl alcohol.

The non-ionic surfactant is preferably an alkylaminoalkoxylate according to the formula:

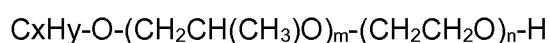


where:

R is a linear or branched hydrocarbon radical containing 1 to 12 carbon atoms; and,

X and y are integer numbers selected so that the total molecular weight of the surfactant exhibits an average molecular weight of from about 2000 to about 8000.

Alternatively, the nonionic surfactant is preferably an alkylpolyoxyether according to the formula:



where:

x is from 6-24;

y is from 17-49;

m is from 0-10 and n is from 1-40;

wherein the total molecular weight of the surfactant exhibits an average molecular weight of from about 500 to about 8000.

Suitable non-ionic surfactants include the condensation products of a higher alcohol (e.g., an alkanol containing about 8 to 18 carbon atoms in a straight or branched chain configuration) condensed with about 5 to 30 moles of ethylene oxide (n is from 5 to 30 and m is zero), for example, lauryl or myristyl alcohol condensed with about 16 moles of ethylene oxide (EO), tridecanol condensed with about 6 moles of EO, myristyl alcohol condensed with about 10 moles of EO per mole of myristyl alcohol, the condensation product of EO with a cut of coconut fatty alcohol containing a mixture of fatty alcohols

with alkyl chains varying from 10 to about 14 carbon atoms in length and wherein the condensate contains either about 6 moles of EO per mole of total alcohol or about 9 moles of EO per mole of alcohol and tallow alcohol ethoxylates containing 6 EO to 11 EO per mole of alcohol.

5

Suitable examples of the non-ionic surfactant is lauryl alcohol condensed with 5, 6, 7, 8 and 9 moles of ethylene oxide (Laureth 5, Laureth 6, Laureth 7, Laureth 8 and Laureth 9), condensates of 2 to 30 moles of ethylene oxide with sorbitan mono- and tri-C₁₀-C₂₀ alkanolic acid esters having a HLB of 8 to 15, preferably polyoxyethylene (4) sorbitan monolaurate, polyoxyethylene (4) sorbitan monostearate, polyoxyethylene (20) sorbitan trioleate and polyoxyethylene (20) sorbitan tristearate.

Particularly preferred is lauryl alcohol condensed with 5, 6, 7, 8 and 9 moles of ethylene oxide (Laureth 5, Laureth 6, Laureth 7, Laureth 8 and Laureth 9), more preferably lauryl alcohol condensed with 5, 7 and 9 moles of ethylene oxide (Laureth 5, Laureth 7 and Laureth 9).

Suitable example of non-ionic surfactants where m is 1 or greater are Plurafac type surfactants (BASF), where X is from 6 to 10, m is 3 and n is 6 to 8 C₆-10-(PO)₃(EO)₆, the Lutensol series surfactants, for examples where X is 10 and m is 1 to 2 and n is 4 to 14 or the Ecosurf series of surfactants (DOW), for example where X is 6 to 12, m is 3 to 4 and n is 4 to 9.

The non-ionic surfactant is preferably, an amine oxide according to the formula:

25
$$R^1R^2R^3N-O,$$

where R¹ is an alkyl group of 8 to 20 carbon atoms and R² and R³ are each alkyl or hydroxyalkyl groups of 1 to 3 carbon atoms. Preferably, wherein R¹ is an alkyl group of 10 carbon atoms, R² and R³ are a (CH₂CH)₂OH group. An especially preferred amine oxide is AO-14-2 from Tomah Products, Inc.

30

The non-ionic surfactant is preferably an alkylpolyglycosyl containing a C₆₋₂₂ fatty alcohol residue, more preferably a C₈₋₁₈ fatty alcohol residue, wherein the glycosyl residue of the alkyl polyglycoside preferably comprises a linear oligo- or polysaccharide.

35

Preferably, the non-ionic surfactant is a rhamnolipids. Rhamnolipids are a class of glycolipid. They are constructed of rhamnose combined with beta- hydroxy fatty acids. Rhamnose is a sugar. Fatty acids are ubiquitous in animals and plants. The carboxyl end of the fatty acid end is connected to the rhamnose. Rhamnolipids are compounds of only three common elements; carbon, hydrogen, and oxygen. They are a crystalline acid.

Rhamnolipids may be produced by strains of the bacteria *Pseudomonas aeruginosa*. There are two major groups of rhamnolipids; mono-rhamnolipids and di-rhamnolipids.

Mono-rhamnolipids have a single rhamnose sugar ring. A typical mono-rhamnolipid produced by *P. aeruginosa* is L-rhamnosyl- -hydroxydecanoyl- -hydroxydecanoate (RhaCi₀Ci₀). It may be referred to as Rha-Ci₀-Ci₀, with a formula of C₂₆H₄₈O₉. Mono-rhamnolipids have a single rhamnose sugar ring. The IUPAC Name is 3-[3-
[(2R,3R,4R,5R,6S)-3,4,5-trihydroxy-6-methyloxan- 2-yl]oxydecanoyloxy]decanoic acid.

Di-rhamnolipids have two rhamnose sugar rings. A typical di-rhamnolipid is L-rhamnosyl-L- rhamnosyl- -hydroxydecanoyl- -hydroxydecanoate (Rha₂Ci₀Ci₀). It may be referred to as Rha- Rha-C-i₀-C-i₀, with a formula of C₃₂H₅₈O₁₃. The IUPAC name is 3-[3-[4,5-dihydroxy-6-methyl-3-(3,4,5-trihydroxy-6-methyloxan-2-yl)oxyoxan-2-yl]oxydecanoyloxy]decanoic acid.

The non-ionic surfactant provides at least 90 wt.% of the total amount by weight of surfactant contained in the composition. Preferably, the non-ionic surfactant provides at least 95 wt.% of the total amount by weight of surfactant contained in the composition, even more preferably, the non-ionic surfactant provides at least 100 wt.% of the total amount by weight of surfactant contained in the composition.

Preferably, the preservation system further comprises an additional preservation chemical selected from: aromatic alcohol, benzoic acid or a salt thereof, terpineol, geraniol, perillyl alcohol, menthol, terpinene, linalool, citronellol and mixtures thereof thereof.

The aromatic alcohol is preferably selected from group consisting of ethylvanillin, eugenol, thymol, P-hydroxybenzaldehyde, 4n butyl phenol, P-hydroxyacetophenone, vanillin, salicylic acid or salt thereof, o-cymen-5-ol, carvacrol and mixtures thereof.

Preferably, the pH of the composition is in the range of 2 to 12, more preferably in the range of 2 to 11, even more preferably in the range of 3 to 10, most preferably in the range 3 to 7.

- 5 The composition further comprises water. Preferably 80 to 95%, more preferably 90 to 98 wt.%. Preferably not less than 80 wt.% water, still more preferably not less than 85 wt.%.

The composition preferably comprises less than 1% by weight of silicone.

10

Optional Ingredients

- The composition according to the invention may contain other ingredients which aid in the cleaning or sensory performance. Compositions according to the invention can also contain, in addition to the ingredients already mentioned, various other optional
- 15 ingredients such as thickeners, colorants, preservatives, polymers, anti-microbial agents, perfumes, pH adjusters, sequesterants, alkalinity agents and hydrotropes. Typically, the compositions according to the invention comprise an alkyl fatty acid. Preferably, the alkyl fatty acid is a mixture of fatty acids comprising an alkyl fatty acid selected from the group consisting of lauric acid, caprylic acid, capric acid, myristic acid,
- 20 palmitic acid, stearic acid and mixtures thereof. Mixtures of alkyl fatty acids are also known as coconut fatty acids, available from Croda (UK). Preferably alkyl fatty acids are present in a range of 0 to 1 wt.%, more preferably 0.01 to 0.5, even more preferably 0.05 to 0.25 wt.%.

- 25 In a second aspect, the present invention relates to a method for cleaning a hard surface comprising the steps of diluting 1 part of a composition according to claims 1-10 with 2-50 parts water to provide a cleaning solution and contacting the hard surface with the cleaning solution.

- 30 Hard surface', as used herein, typically means utensils or kitchenware, kitchen tops, floors, sinks, tiles, kitchen floors and bathrooms.

- In a third aspect, the present invention relates to a method of preserving a cleaning composition comprising the steps of combining a short chain (C_1 to C_6), unsaturated,
- 35 organic acid or salt thereof having at least two carboxyl groups, wherein the short chain unsaturated organic acid is itaconic acid or salt thereof, with a nonionic surfactant.

The invention will now be illustrated by means of the following non-limiting examples.

Examples

- 5 Liquid detergent compositions were prepared having the base formulation according to Table 1:

Table 1

Ingredient	Percentage ingredient
Water	balance
Coconut Fatty acid (Prifac, Croda)	0.085
alcohol ethoxylate (Type C9-C11 EO; Shell)	2
Organic acid + pH adjustment	1.0
Colour / fragrance	0,35

- 10 Citric acid, lactic acid and itaconic acid were added to the cleaning composition an amount of 1.0 wt.%, based on the weight of the composition.

Sample preparation

- 15 Itaconic acid, lactic acid and citric acid were purchased from Sigma-Aldrich. Six samples of unpreserved conditioner were dosed with 0.5% and 1% (w/w) itaconic acid, citric acid and lactic acid separately. An unpreserved sample was kept as a control. Each dosed product was adjusted to pH 5 using 50% sodium hydroxide (Sigma-Aldrich).

20

Challenge test method

- A modified challenge test method was performed on a subsample of both the unpreserved and each dosed product. The bacterial challenge test microorganisms are summarised in data tables with an inoculum level of 2.69×10^7 CFU/G introduced into each sample. The microbial challenge pools were added to each sample container at a ratio of 1:10 microorganism to product. Each inoculated product sample was mixed with a sterile spatula to ensure a homogenous distribution of the inocula throughout the product.
- 25

Table 2: Microbial Challenge test pool and Inoculum levels

Microorganism	Pool Inoculum CFU/mL	In-product inoculum CFU/G
<i>Pseudomonas aeruginosa</i> , <i>Burkholderia cepacia</i> and <i>Pseudomonas putida</i>	2.69x10 ⁸	2.69x10 ⁷

Both the inoculum level and the level of microorganism within each sample was

5 quantified using a Total Viable Count (TVC) pour plate method after contact times as indicated in Table 3. A 1:10 dilution was made with a subsample of each product, performed separately in Peptone (0.1%)/ tween 80 (2%) neutralising agent. A 1:10 and 1:100 dilution of each subsample was performed and pour plates produced at each

10 dilution using tryptone soya agar. Plates were incubated at 28°C for 48 hours and then examined for growth. Visible colonies were counted with the aid of a Quebec Colony Counter and recorded for analysis against the challenge test criteria.

Table 3: Microbial challenge test against *Pseudomonas aeruginosa*, *Burkholderia cepacia* and *Pseudomonas putida* log kill

15

Sample	Organic acid	Log reduction				
		24 hours	48 hours	5 hours	7 days	14 days
1	None	<2.61	<2.61	<2.61	<2.61	<2.61
2	Itaconic acid	>6.61	>6.61	>6.61	>6.61	>6.61
3	Lactic acid	<2.82	3.11	<2.61	<2.61	<2.61
4	Citric acid	<2.61	<2.61	<2.61	<2.61	<2.61

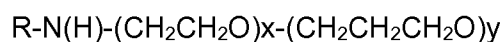
Claims

1. A liquid detergent composition comprising:
 - a) 1 to 50% by weight of a non-ionic surfactant,
 - b) 0.1 to 5% by weight of a preservation system comprising a short chain (C_1 to C_6), unsaturated, organic acid or salt thereof having at least two carboxyl groups,
 - c) water;

and wherein the non-ionic surfactant provides at least 90 wt.% of the total amount by weight of surfactant contained in the composition;

wherein the short chain unsaturated organic acid is itaconic acid or salt thereof.

2. The composition according to any of the preceding claims wherein the pH is in the range of 2 to 12, more preferably in the range of 2 to 11, even more preferably in the range of 3 to 10, most preferably in the range 3 to 7.
3. The composition according to any of the preceding claims, wherein the non-ionic surfactant is selected from the group consisting of primary alcohol ethoxylates, secondary alcohol ethoxylates, alkylphenol ethoxylates, alkylaminoalkoxylates, alkylpolyoxyether, ethylene-oxide-propylene oxide condensates on primary alkanols, tertiary amino oxides alkylpolyglycosyls and mixtures thereof, preferably a primary or secondary alcohol ethoxylate.
4. The composition according to according to any of the preceding claims, wherein the non-ionic surfactant comprises an alkylaminoalkoxylate according to the formula:

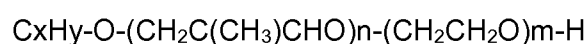


where:

R is a linear or branched hydrocarbon radical containing 1 to 12 carbon atoms; and,

X and y are integer numbers selected so that the total molecular weight of the surfactant exhibits an average molecular weight of from about 2000 to about 8000.

5. The composition according to according to any of the preceding claims, wherein the nonionic surfactant comprises an alkylpolyoxyether according to the formula:



where:

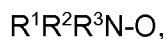
x is from 6-24;

y is from 17-49;

m is from 0-10 and n is from 1-40;

wherein the total molecular weight of the surfactant exhibits an average molecular weight of from about 500 to about 8000.

6. The composition according to any of the preceding claims, wherein the non-ionic surfactant comprises an amine oxide according to the formula:



where R^1 is an alkyl group of 8 to 20 carbon atoms and R^2 and R^3 are each alkyl or hydroxyalkyl groups of 1 to 3 carbon atoms.

7. The composition according to any of the preceding claims, wherein the non-ionic surfactant comprises an alkylpolyglycosyl containing a C_{6-22} fatty alcohol residue, more preferably a C_{8-18} fatty alcohol residue, wherein the glycosyl residue of the alkyl polyglycoside preferably comprises a linear oligo- or polysaccharide.
8. The composition according to any of the preceding claims, wherein the non-ionic surfactant is lauryl alcohol condensed with 5, 7 and 9 moles of ethylene oxide (Laureth 5, Laureth 7 and Laureth 9), condensates of 2 to 30 moles of ethylene oxide with sorbitan mono- and tri- $C_{10}-C_{20}$ alkanolic acid esters having a HLB of 8 to 15, preferably polyoxyethylene (4) sorbitan monolaurate, polyoxyethylene (4) sorbitan monostearate, polyoxyethylene (20) sorbitan trioleate and polyoxyethylene (20) sorbitan tristearate.
9. The composition according to any of the preceding claims, wherein the preservative system further comprises an additional preservation chemical selected from an aromatic alcohol, benzoic acid or a salt thereof, terpineol, geraniol, perillyl alcohol, menthol, terpinene, linalool, citronellol and mixtures thereof.
10. The composition according to any of the preceding claims, comprising at least 0.5% by weight of itaconic acid.
11. The composition according to any of the preceding claims, comprising 60-90% by weight of water.
12. The composition according to any of the preceding claims, comprising less than 1% by weight of silicone.

13. A method for cleaning a hard surface comprising the steps of diluting 1 part of a composition according to claims 1-10 with 2-50 parts water to provide a cleaning solution and contacting the hard surface with the cleaning solution.
14. A method of preserving a cleaning composition comprising the steps of combining a short chain (C_1 to C_6), unsaturated, organic acid or salt thereof having at least two carboxyl groups, wherein the short chain unsaturated organic acid is itaconic acid or salt thereof, with a nonionic surfactant.

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2019/081362

A. CLASSIFICATION OF SUBJECT MATTER		
INV. C11D1/42	C11D1/66	C11D1/722 C11D1/75 C11D3/20
ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) C11D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98/49257 A1 (PROCTER & GAMBLE [US]; PACE LUIGI [IT] ET AL.) 5 November 1998 (1998-11-05) claims 1-3 page 4, line 6 - line 9 page 7, line 1 - page 8, line 9 page 9, line 29 - page 10, line 2 page 13, line 19 - line 22 page 29, line 14 - line 30 page 31, line 25 - page 34, line 13 -----	1-3,9-14
X	WO 2011/092325 A2 (ECOLIFE B V [NL]; DEVELTER DIRK WILLEM GODFRIED [BE] ET AL.) 4 August 2011 (2011-08-04) claims 1, 2 and 11; examples 5, 7-8 page 27, line 22 - page 32, line 21 ----- -/-	1-3,9-14
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 13 January 2020		Date of mailing of the international search report 16/03/2020
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Agra-Gutierrez, C

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2019/081362

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

2, 3, 9-13(completely); 1, 14(partially)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2019/081362

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 94/05758 A1 (PROCTER & GAMBLE [US]; DYET JULIE ANNE [GB] ET AL.) 17 March 1994 (1994-03-17) page 21, line 20 - page 23, line 13 -----	1-3,9-14

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 2, 3, 9-13(completely); 1, 14(partially)

A liquid detergent composition and a corresponding method of cleaning, the composition comprising: a) 1 to 50% by weight of a non-ionic surfactant, b) 0.1 to 5% by weight of a preservation system comprising a short chain (C1 to C6), unsaturated, organic acid or salt thereof having at least two carboxyl groups, c) water; with the non-ionic surfactant providing at least 90 wt.% of the total amount by weight of surfactant contained in the composition; and with the short chain unsaturated organic acid being itaconic acid or salt thereof; and a method of preserving a cleaning composition comprising the steps of combining a short chain (C1 to C6), unsaturated, organic acid or salt thereof having at least two carboxyl groups and being itaconic acid or salt thereof with a nonionic surfactant; with the composition and the method comprising the technical features of claims 1, 2, 9-14 and 15 respectively, and with the composition comprising a non-ionic surfactant, as a generic chemical and substance, and with the short chain unsaturated organic acid being itaconic acid or salt thereof.

2. claims: 2-4, 9-13(completely); 1, 14(partially)

A liquid detergent composition and a corresponding method of cleaning, the composition comprising: a) 1 to 50% by weight of a non-ionic surfactant, b) 0.1 to 5% by weight of a preservation system comprising a short chain (C 1 to C 6), unsaturated, organic acid or salt thereof having at least two carboxyl groups, c) water; with the non-ionic surfactant providing at least 90 wt.% of the total amount by weight of surfactant contained in the composition; with the short chain unsaturated organic acid being itaconic acid or salt thereof; with the composition and the method comprising the technical features of claims 1-4 and 9-14, and with the composition comprising an alkylaminoalkoxylate as non-ionic surfactant, as defined by the formula of claim 4.

3. claims: 2, 3, 5, 9-13(completely); 1, 14(partially)

A liquid detergent composition and a corresponding method of cleaning, the composition comprising: a) 1 to 50% by weight of a non-ionic surfactant, b) 0.1 to 5% by weight of a preservation system comprising a short chain (C 1 to C 6), unsaturated, organic acid or salt thereof having at least two carboxyl groups, c) water; with the non-ionic surfactant providing at least 90 wt.% of the total amount by weight of surfactant contained in the composition; and with the short chain unsaturated organic acid being itaconic acid or salt thereof; with the composition and the method comprising the

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technical features of claims 1-3, 5 and 9-14, and with the composition comprising a mixed alkylpolyoxyether as non-ionic surfactant, as defined by the formula of claim 5.

4. claims: 2, 3, 6, 9-13(completely); 1, 14(partially)

A liquid detergent composition and a corresponding method of cleaning, the composition comprising: a) 1 to 50% by weight of a non-ionic surfactant, b) 0.1 to 5% by weight of a preservation system comprising a short chain (C1 to C6), unsaturated, organic acid or salt thereof having at least two carboxyl groups, c) water; with the non-ionic surfactant providing at least 90 wt.% of the total amount by weight of surfactant contained in the composition; and with the short chain unsaturated organic acid being itaconic acid or salt thereof; with the composition and the method comprising the technical features of claims 1-3, 6 and 9-14, and with the composition comprising an amine oxide as non-ionic surfactant, as defined by the formula of claim 6.

5. claims: 2, 3, 7, 9-13(completely); 1, 14(partially)

A liquid detergent composition and a corresponding method of cleaning, the composition comprising: a) 1 to 50% by weight of a non-ionic surfactant, b) 0.1 to 5% by weight of a preservation system comprising a short chain (C1 to C6), unsaturated, organic acid or salt thereof having at least two carboxyl groups, c) water; with the non-ionic surfactant providing at least 90 wt.% of the total amount by weight of surfactant contained in the composition; and with the short chain unsaturated organic acid being itaconic acid or salt thereof; with the composition and the method comprising the technical features of claims 1-3, 7 and 9-14, and with the composition comprising an alkylpolyglycosyl as non-ionic surfactant, as defined by claim 7.

6. claims: 2, 3, 8-13(completely); 1, 14(partially)

A liquid detergent composition and a corresponding method of cleaning, the composition comprising: a) 1 to 50% by weight of a non-ionic surfactant, b) 0.1 to 5% by weight of a preservation system comprising a short chain (C 1 to C 6), unsaturated, organic acid or salt thereof having at least two carboxyl groups, c) water; with the non-ionic surfactant providing at least 90 wt.% of the total amount by weight of surfactant contained in the composition; and with the short chain unsaturated organic acid being itaconic acid or salt thereof; with the composition and the method comprising the technical features of claims 1-3 and 8-14, and with the composition comprising a lauryl alcohol condensed with ethylene oxide, or condensates of ethylene oxide with sorbitan mono- and tri-alkanoic acid esters , as non-ionic

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surfactant, as defined by claim 8.

INTERNATIONAL SEARCH REPORT

Information on patent family members

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