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(54) Bi-continuous micro-emulsion detergent composition

(57) The present invention is in the field of detergent compositions; in particular high active liquid detergent compositions, for use in laundry and/or household cleaning amongst others. The compositions of the present invention relate to the field of to micro-emulsions, in particular bi-continuous micro-emulsions. It is an object of the present invention to provide a composition that provides fast dissolution of solid fatty material. It has been found that a bi-continuous micro-emulsion detergent composition comprising a short chain non-ionic surfactant, provides a concentrated liquid detergent composition that removes soils and/or stains of solid or solidified fatty material in the main wash at neutral pH.

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Description

Field of the invention

[0001] The present invention is in the field of detergent compositions; in particular high active liquid detergent compositions, for use in laundry and/or household cleaning amongst others. The compositions of the present invention relate to the field of to-micro-emulsions, in particular bi-continuous micro-emulsions.

Background of the invention

[0002] Liquid detergent compositions are widely appreciated and preferred by many modern day consumers in both developed and developing and emerging markets. Such liquid detergent compositions are primarily used in Laundry and household care applications.

[0003] One of the most common problems is the removal of fatty stains and/or soil, especially solid or solidified fatty stains and/or soils. This is a problem in the field of household cleaning (e.g. kitchen surfaces, dish washing) and in the field of laundry and fabric washing (e.g. cuffs and collars).

[0004] Liquid detergent compositions are widely known in the art. Liquid detergent compositions generally comprise a surfactant active and a solvent. Liquid detergent compositions may further comprise perfume, builder, polymers, bleach, thickeners, fluorescers, and other common detergent ingredients. Liquid detergent compositions are often structured, e.g. to control the viscosity of the liquid or to improve stability and prevent phase separation or to be able to incorporate ingredients that are water insoluble.

[0005] One form of a stable liquid detergent composition is a detergent composition in the form of an emulsion. A defined kind of emulsion is the micro-emulsion. Generally emulsions are opaque liquids which are not appreciated by modern day consumers. Micro-emulsions can be made transparent and typically have a lower viscosity too.

[0006] WO95/27034 discloses detergent compositions in the form of oil in water micro-emulsions providing rapid stain removal. The composition of WO95/27034 comprises a surfactant system comprising short chain length non-ionic alcohol ethoxylates having less than 12 carbon atoms and with at least 45% of C10 material. It is found that these oil in water micro-emulsions do not provide adequate dissolution of fatty stains and soils when applied neat. Fast fat (or oily soil) solubilisation when applied neat onto a fatty stain or soil remains to be desired for amongst other the dissolution of sebum on shirt collars and fatty soils on hard surfaces.

[0007] Micro-emulsions have also been disclosed in a number of other documents such as US 5,415,812, which discloses a light duty detergent composition; or US 4,438,009, which discloses low solvent laundry pre-treatment compositions.

[0008] Other pre-treatment compositions have been proposed, mostly in the field of laundry and fabric cleaning, for providing stain removal.

[0009] In US 4,561,991 laundry pre-treatment compositions are disclosed in the form of micro-emulsions. It discloses mixtures of polyamines and grease cutting solvents. Other surfactants such as non-ionic surfactants are also disclosed.

[0010] What remains to be desired is a liquid detergent composition that removes soils and/or stains of solid or solidified fatty material in the main wash at neutral pH. It is an object of the present invention to provide a composition that provides fast dissolution of solid fatty material.

[0011] It is another object of the invention to provide a stable concentrated detergent composition having up to 90% of surfactant material.

[0012] It is another object of the invention to provide a transparent concentrated detergent composition.

[0013] It is another object of the invention to provide a concentrated detergent composition that shows fast dissolution in water.

[0014] It is yet another object of the invention to provide a concentrated detergent composition having a low viscosity.

[0015] It is yet another object of the invention to provide a liquid detergent composition that provides fast dissolution of oily/fatty stains or soil when applied neat.

[0016] Surprisingly it has been found that a bi-continuous micro-emulsion detergent composition comprising a short chain non-ionic surfactant, provides a concentrated liquid detergent composition that removes soils and/or stains of solid or solidified fatty material in the main wash at neutral pH.

Summary of the invention

[0017] Accordingly the present invention provides a Bi-continuous micro-emulsion detergent composition comprising 40-90% by weight of a surfactant system comprising: 10-50% by weight of the surfactant system of a linear or branched fatty alcohol having 5-8 carbon atoms or a condensation product of a linear or branched fatty alcohol having 5-8 carbon atoms and containing not more than 5 alkylene oxide groups and mixtures thereof and a further surfactant, 5-30% by

weight of an aqueous solution comprising: water an electrolyte; characterized in that the aqueous solution has an ionic strength of 0.1 - 4 mol/l, 5-30% by weight of an oil or solvent characterized by having a Hansen solubility of between 14 and 20 $(MPa)^{0.5}$; and a solubility of solid trilaurin fatty matter into the oil of more than 3% by weight; and further characterized in that the viscosity of the composition is less than 1000 mPa.s (25°C and $20s^{-1}$).

[0018] In another aspect the invention provides a process for preparing a micro-emulsion according to any one of claims 1 to 9 comprising the steps in sequence of: adding in the surfactant system to an oil/solvent, mixing them together by an overhead stirrer, adding optional hydrophobic ingredients, adding aqueous phase containing electrolytes.

[0019] Although the examples in this application are predominantly showing laundry applications, it is noted that household cleaning applications, including hard surface cleaning applications, dishwashing, etc and fabric conditioning applications are also included in the scope of this application.

[0020] These and other aspects, features and advantages will become apparent to those of ordinary skill in the art from a reading of the following detailed description and the appended claims. For the avoidance of doubt, any feature of one aspect of the present invention may be utilised in any other aspect of the invention. The word "comprising" is intended to mean "including" but not necessarily "consisting of" or "composed of." In other words, the listed steps or options need not be exhaustive. It is noted that the examples given in the description below are intended to clarify the invention and are not intended to limit the invention to those examples per se. Similarly, all percentages are weight/weight percentages unless otherwise indicated. Except in the operating and comparative examples, or where otherwise explicitly indicated, all numbers in this description indicating amounts of material or conditions of reaction, physical properties of materials and/or use are to be understood as modified by the word "about". Numerical ranges expressed in the format "from x to y" are understood to include x and y. When for a specific feature multiple preferred ranges are described in the format "from x to y", it is understood that all ranges combining the different endpoints are also contemplated.

Detailed description

[0021] The invention relates to bi-continuous micro-emulsion detergent composition.

Bi-continuous micro-emulsion

[0022] A bi-continuous micro-emulsion has a microstructure of oil and water channels spanning across a sample (sample spanning) unlike discrete droplet configuration as found in oil-in-water (o/w) and/or water-in-oil (w/o) micro-emulsion types. These sample spanning oil or water channels interact with hydrophobic or hydrophilic soils, present on substrates, equally well and help in faster solubilisation of soil/dirt, especially solid oily or fatty stains or soils. These structures may be characterised by various known experimental techniques, including electrical conductivity, viscosity, light scattering, SAXD, SANS and NMR self diffusion.

[0023] The oil-water interfacial tension is the lowest in this structure compared to o/w or w/o type micro-emulsions. The viscosity of a bi-continuous micro-emulsion is typically higher than that of corresponding o/w or w/o type because of sample spanning channels.

[0024] The bi-continuous micro-emulsion also has a higher capacity for solubilising further ingredients into the emulsions, compared to o/w and w/o micro-emulsions.

[0025] The bi-continuous micro-emulsions according to the invention are typically Newtonian liquids. They are typically not shear thinning.

Surfactant system

[0026] The compositions of the invention comprise 40 to 90% by weight of the composition of a surfactant system, preferably at least 45% by weight, more preferably at least 50% by weight, or even at least 60% by weight.

[0027] High active compositions, even preferably comprise at least 50% by weight, more preferably at least 60% by weight or even at least 70% by weight of the surfactant system.

[0028] Other liquid laundry or fabric cleaning compositions, fabric conditioning compositions and household cleaning compositions (e.g. dishwashing compositions) preferably comprise not more than 80% by weight, more preferably not more than 70% by weight, still more preferably not more than 60% by weight, or even not more than 50% by weight.

[0029] The surfactant system of the compositions of the present invention comprises a linear or branched fatty alcohol or a condensation product of a linear or branched fatty alcohol and alkylene oxide (e.g. ethylene oxide and/or propylene oxide), preferably ethylene oxide (also known as ethoxylated fatty alcohol or alcohol ethoxylate). The linear or branched fatty alcohol chain comprises from 5 to 8 carbon atoms. When the fatty alcohol is alkoxylated, the number of alkylene oxide groups is not more than 5, preferably between 1 and 4. Ethylene oxide (EO) groups are the most preferred.

[0030] The linear or branched fatty alcohol, or alkoxylated fatty alcohol is present in the composition in a concentration

of from 10 to 50% by weight based on the surfactant system, preferably at least 15%, or even at least 20% by weight based on the surfactant system, but preferably not more than 40%, more preferably not more than 35%, or even not more that 30% by weight based on the surfactant system.

Further surfactant

[0031] The surfactant system further comprises a further surfactant. In general, the surfactants may be chosen from the surfactants described in well known textbooks like "Surface Active Agents" Vol. 1, by Schwartz & Perry, Interscience 1949, Vol. 2 by Schwartz, Perry & Berch, Interscience 1958, and/or the current edition of "McCutcheon's Emulsifiers and Detergents" published by Manufacturing Confectioners Company or in "Tenside-Taschenbuch", H. Stache, 2nd Edn., Carl Hauser Verlag, 1981.

[0032] Such surfactants include anionic surfactants, cationic surfactants, non-ionic surfactants, zwitterionic surfactants and/or amphoteric surfactants and mixtures thereof.

[0033] In laundry and fabric cleaning compositions, anionic and non-ionic surfactants are most preferred, while any surfactant may be used in household cleaning compositions.

[0034] For a dish washing liquids, anionic and non-ionic surfactants, and combinations are the most preferred. For hard surface spray cleaner (spray and wipe) any surfactant may be used.

[0035] Hard water tolerant surfactants, such as alkyl ether sulphates (e.g. SLES), alkoxylated non-ionic surfactants, alkanol amides and AOS (alpha-olefin sulphonates) are especially preferred.

Oil or solvent

[0036] The composition further comprises 5 to 30% by weight of an oil or a solvent characterized by having a Hansen solubility of between 14 and 20 $(MPa)^{0.5}$; and a solubility of solid triglyceride fatty matter into the oil and/or solvent of more than 3% by weight.

[0037] The Hansen solubility at least 15 $(MPa)^{0.5}$, more preferably at least 16 $(MPa)^{0.5}$, and typically not more than 19 $(MPa)^{0.5}$ or even not more than 18 $(MPa)^{0.5}$.

[0038] Preferably the solubility of solid trilaurin (a triglyceride) fatty matter into the oil is more than 5%, or even more than 10%. This percentage is based on the aggregate amount of the oil and/or solvent and the trilaurin dissolved therein.

[0039] The oil is preferably selected from essential oils, fatty acid oils, mono- di- and tri-glycerides, sugar derived polyesters and sucrose polyesters, and terpenes.

[0040] Preferred essential oils are essential oils derived from plant sources, e.g. citronella, orange peel, lemon grass oil, citrodora, neem *(Azadirachta indica)* oil, etc. Preferred fatty acids are C8-22 fatty acids and including di- and tricarboxylic acids and oligomeric fatty acids (such as commercially available as Pripol 1017 ex. Unichema). Preferred mono, di- and triglycerides include those of medium chain glycerides, which are liquid at ambient conditions are also contemplated. Preferred terpenes are limonene, eugenol and terpineol.

[0041] The solvent is preferably selected from fatty acid alkyl esters and/or fatty alcohols preferably derived from renewable sources such as palm, coconut, soybean, with fatty acid chain length distributions from C7-C22 and alkyl chain length distributions 1-22 for the ester group.

[0042] Combinations of any of the oils and/or solvents are also included in the scope of this invention.

[0043] The melting point of said fatty acid ester is preferably less than 40°C, more preferably less than 10°C and most preferably less than 5 °C.

[0044] When biodegradability is not a requirement, other solvents and oils that are considered are linear and/or branched alkanes.

Aqueous solution

[0045] The composition comprises 5-30% by weight of an aqueous solution, having an ionic strength of from 0.1 to 4 mol/l, preferably at least 0.2 mol/l, or even at least 0.5 mol/l, but preferably not more than 3.5 mol/l, or even not more than 3 mol/l.

[0046] The aqueous composition comprises water and an electrolyte.

[0047] The electrolyte is typically present in the composition in such a concentration that the ionic strength is in the above given range. Typically the electrolyte is present in a concentration of up to 15 % by weight based on the aqueous solution, when the electrolyte is a monovalent electrolyte salt. The required amount is dependent on the type of electrolyte used and its valance.

[0048] Without wishing to be bound by a theory, it is found that the electrolyte requirement follows the Schulze-Hardy rule for colloidal solutions, which defines the amount needed on the bases of the required concentration of a monovalent electrolyte divided by the $(valence)^6$; for example, when 15% of NaCl would be required to form a micro-emulsion, it

could be replaced by $CaCl_2$ in a concentration of about $15\%/2^6=15\%/64=0.23\%$.

[0049] Preferably monovalent electrolytes are present in a concentration of between 1 and 15% based on the aqueous solution.

[0050] Preferably divalent electrolytes are present in a concentration of between 0.01 and 4% based on the aqueous solution.

[0051] Preferably trivalent and multivalent electrolytes are present in a concentration of between 0.005 and 2% based on the aqueous solution.

[0052] Preferred electrolytes are citrates, halides (preferably chlorides), phosphates, sulphates and sulphites of alkali metal and alkaline earth metals; other suitable electrolytes are aluminium chloride and ferric chloride and mixtures of any of the above.

[0053] Hydroxide salts are not preferred, due to unfavourable pH effects and undesirable reactions.

Optional ingredients

[0054] The composition may further comprise builder, anti-redeposition agents, mosquito and/or insect repellents, shading dyes, antimicrobial agents (oil based), oil-soluble bleach, oil-soluble fluorescer, enzymes, perfumes and soil release polymers.

[0055] The bleach is preferably in the form of organic peracid (e.g. PAP = phthalimido perhexanoic acid) and it is typically incorporated in to the composition up to 10 % by weight, preferably up to 8% by weight, more preferably up to 5% by weight; typically between 0.5 and 4%, or even between 1 and 2% by weight. The bleach ingredient preferably has a low solubility in water (less than 200 ppm at 30 °C), but high solubility (more than 0.5% by weight) in oil/solvent. The bleach ingredient is preferably solubilised in the oil/solvent phase of the bi-continuous micro-emulsion. It is expected that the bleach ingredient acts on soil during the interaction of oil droplets with the soiled substrates. When bleach is incorporated, the pH of the composition is preferably acidic to neutral for stability reasons; the preferred pH is in the range of 5 to 7.

[0056] Mosquito repellent ingredients such as citrodora oil, citronella oil, lemon grass oil and their mixtures. May be incorporated up to 30 % by weight. Mosquito repellency has been demonstrated on shirts, washed with compositions containing at least 6 % by weight of any one of the above agents and mixtures thereof.

[0057] Perfume may be incorporated in the composition in a concentration of between 0.1 and 5% by weight. Typically the concentration is less than 3%, even less than 2%; generally the perfume is present in a concentration of between 0.5 and 1 % by weight. It is demonstrated that perfume incorporated in a micro-emulsion provides up to 10 times better deposition on fabrics and the perfume remains for a longer period compared to only surfactant solution containing equivalent amount of perfume.

Viscosity

[0058] The viscosity of the composition is preferably low. By low is meant not more than 1000 mPa.s, more preferably not more than 500 mPa.s, preferably less than 300 mPa.s, still more preferably less than 200 mPa.s, or even less than 150 mPa.s. It is preferred that the composition has a viscosity of more than 5 mPa.s, more preferably more than 10 mPa.s, still more preferably more than 20 mPa.s or even more than 50 mPa.s. All viscosities mentioned are measured by a Carrimed CSL-1 00 viscometer with standard cone and plate geometry, at 20 $sec^{-1}$and 25°C.

pH

[0059] The pH is preferably around neutral in a range of 5 to 9, preferably at least 6 and not more than 8. Any known pH adjustment agents or buffer may be used when required.

[0060] For peracid bleach containing compositions, the pH is preferably between 5 and 7.

Process

[0061] The micro-emulsion is preferably made by adding in sequence the surfactant system to a oil/solvent, mixing them together by an overhead stirrer, adding optional hydrophobic ingredients such as fluorecser, essential oils/perfumes; adding aqueous phase containing electrolytes and adding enzymes/bleaches

[0062] Optional hydrophobic ingredients include fluorescer, perfume and water insoluble soil release polymers (e.g. gerol, trademark ex Rhodia).

[0063] Ingredients such as bleach, enzymes, water soluble soil release polymers (Sodium carboxy methyl cellulose) are typically only added to the composition after forming the micro-emulsion.

Product format

[0064] The laundry product may be packaged in a standard bottle. Prespotting products are typically filled into a dispensing device, such as, stain pens, roller balls, brush pens, and/or spays dispensers (e.g. trigger spray dispensers or squeeze bottles). Household cleaning products are typically in the form of trigger sprays. Dishwashing liquids are typically sold in bottles.

[0065] The invention will now be illustrated by means of the following non-limiting examples:

Examples

[0066] Bi-continuous micro-emulsions of the present invention are compared in performance to similar compositions that are not in the form of a micro-emulsion and to commercially available concentrated liquid detergent compositions.

[0067] In compositions, all concentrations are given by weight based on the total composition.

Example 1: Process of making Micro-emulsion detergent composition

[0068] Sodium-LAS (Sodium linear alkylbenzene sulphonate, Unilever) was mixed with ethoxylated alcohol (Imbentin OA/030, C_8EO_3, 100 %, clear liquid). The mixing was carried out by a high speed homogenizer (at 14000 rpm for 15 min). Sodium lauryl ether sulphate (3 EO) (SLES, Galaxy surfactants, Mumbai, India) was added after complete homogenization of the first two ingredients. Water containing dissolved fluorescer, electrolytes (NaCl ,Na_2CO_3 etc.), and enzymes was added to the mixer. Mixing continued till a homogeneous slurry was obtained. d-Limonene (99%, Sigma) oil/solvent was added to the mixer at a lower RPM (2000). A low viscous transparent/translucent product was obtained. Temperature of operation was maintained at 25 °C.

[0069] Two compositions (Composition 1 and comparative composition A, see table below), were prepared according to the above method.

Ingredient	**Composition 1 (%w)**	**Composition A (%w)**
Na LAS	26	26
SLES	22	22
C8-E03*)	16	
C9-11-E03*)		16
d-limonene	18	18
Water	16.8	16.8
NaCl	1.2	1.2
Composition	Clear, transparent, micro-emulsion	Liquid crystalline, opaque
Viscosity (mPa.s)	300	>10000
*) ethoxylated alcohol nonionic surfactant		

Example 2: Cleaning Performance (Bulk wash)

[0070] Desized fabrics (Cotton (C), Polycotton (PC), Polyester (PE)) of 10 by 10 cm were soiled by deposition of a mixture of Trilaurin and carbon soot (1000:1, homogenized by sonication) in hot (80°C) condition without using any solvents. 200 μl was applied per swatch (10 by 10 cm)

[0071] Fabrics were soaked for 30 minutes in a wash liquor containing water and 1.2 g/L of micro-emulsion (composition 1) or the cleaning liquid of comparative composition A. The water hardness was 6 °fH water. The fabrics were then washed for 15 min in a tergotometer filled to 300 ml at 25 °C, at 90 rpm, liquid:cloth ratio = 30 and rinsed twice for 2 min in 6 °fH in water. The swatches were then dried.

[0072] Before washing and after drying and the reflectance of the swatches was measured using a Macbeth color eye spectrophotometer at a wave length of 460nm (UV Exclusive SCI). The reflectance value is the percentage of reflected light at the indicated wavelength. The cleaning performance is measured in the difference (dR) between the before and

after washing (dR460 = R_{after} — R_{before}); the higher the dR value the better the cleaning.

Cleaning Performance in 6 °fH water:

[0073]

Cleaning system	**dR460***		
	Cotton	Polycotton	Polyester
Composition 1	20.5	14.9	20
Comparative Composition A	10.6	11	3.7

[0074] The same experiments were repeated at 48 °fH water instead of 6 °fH water

Cleaning Performance in 48 °fH water:

[0075]

Cleaning system	**dR460***		
	Cotton	Polycotton	Polyester
Composition 1	16.4	19.9	16
Comparative Composition A	11.9	12.7	6.5

[0076] Conclusion: Cleaning performance by 1.2 g/l micro-emulsion on soils, containing solid fat, is superior to eqvt. surfactant solution.

Example 3: Cleaning Performance (Bulk wash) vs commercial product

[0077] Commercially available concentrated liquid detergent composition (Comparative composition B, Persil Small&Mighty, Unilever, UK) was compared with the micro-emulsion of composition 1.

Comparative composition B	**Concentration (%w/w)**
Nonionic alcohol ethoxylate (C12-15 EO7)	20
LAS acid	13
SLES-3EO	5
Fatty acid (Prifac 5908)	4.5
Citric acid	1
NaOH	3
Mono propylene glycol	9
Glycerol	5
Tri ethanol amine	3
Minors (perfume, fluorescer, enzymes, opacifier, sequestrant)	4
Water	Balance to 100%

[0078] All concentrations are based on the total composition

[0079] In order to be able to make a fair comparison between the concentrated micro-emulsion and the less concentrated commercial product the swatches were washed with a wash liquor containing 1.2 g/L micro-emulsion (Composition 1) or 2.0 g/L of the commercial product (comparative composition B) respectively.

[0080] Desized fabrics (C, PC and PE) were stained as in Example 2.

[0081] The fabrics were soaked in the wash liquor containing the above indicated surfactant concentration in water with a hardness of 6 °fH water for 30 min. Then washed for 15 min in tergotometer filled with 300 ml at 25 °C, and 75 rpm. The swatches were rinsed twice for 2 min in 6 °fH water and dried.

[0082] Reflectance values were measured as in example 2

Cleaning system	**dR460***		
	Cotton	Polycotton	Polyester
Composition 1	20.96	19.89	26.95
Comparative Composition B	16.3	16.26	13.17

[0083] It is shown that the micro-emulsion performs better that a commercial liquid detergent.

Example 4: Perfume incorporation

[0084] In this example perfume was incorporated into the micro-emulsion (composition 2) and compared to an non-micro-emulsion liquid detergent composition (comparative composition C).

Ingredient	**Composition 2 (%)**	**Composition C (%)**
Na LAS	9.9	9.9
SLES	8.5	8.5
C8-EO3*)	11	11
C12-EO7*)	27	27
C12 fatty acid methyl ester	19	
Water	19	38
NaCl	2.65	2.65
Perfume	1.4	1.4
Fluorescer and enzyme	1.24	1.24
Composition	Clear, transparent, micro-emulsion	Liquid crystalline, opaque
Viscosity (mPa.s)	100	>10000
*) Ethoxylated alcohol non-ionic surfactant		

[0085] The table above shows a micro-emulsion, compared to the same composition without oil/solvent, not being a micro-emulsion.

[0086] The perfume deposited onto the fabric was quantified by SPM - GC (solid phase micro extraction gas chromatography).

CG counts (peak area)	**Composition 2 ($x10^6$)**	**Composition C ($x10^6$)**
After washing (wet)	14	1.5
1 day (dry)	1.35	0.9
3 days after drying	0.7	0.5

[0087] The table above shows that the perfume effect of the micro-emulsion is better than for a regular detergent (non-micro-emulsion)

Example 5: Mosquito repellence

[0088] In this example mosquito repellent (citrodora oil) was incorporated into the micro-emulsion (composition 3) and compared to the same composition without mosquito repellent an non-micro-emulsion liquid detergent composition (comparative composition D).

Ingredient	Comp 4 (%)	Comp 5 (%)	Comp 6 (%)	Comp 7 (%)
Na LAS	7.7	7.7	7.7	7.7
SLES	6.2	6.2	6.2	6.2
C8-E03*)	9.2	9.2	9.2	9.2
C12-EO7*)	25.7	25.7	25.7	25.7
C12 fatty acid methyl ester	24.4	18.3	6.1	
Citrodora		6.1	18.3	24.4
Water	24.4	24.4	24.4	24.4
NaCl	2.4	2.4	2.4	2.4
Composition	Clear, transparent, micro-emulsion	Clear, transparent, micro-emulsion	Clear, transparent, micro-emulsion	Clear, transparent, micro-emulsion
Viscosity (mPa.s)	100	100	100	100
*) Ethoxylated alcohol non-ionic surfactant				

[0089] The table above shows a micro-emulsion, compared to the same composition without oil/solvent, not being a micro-emulsion.

[0090] The mosquito repellence was tested by a panel of 4 volunteers. Each panellist wore a shirt washed with 2 g/L (see wash method above) of any of the compositions in an area having many mosquitos. The example was repeated twice (4 times 2 = 8 tests). The table below gives average values.

Ingredient	Comp 4 (%)	Comp 5 (%)	Comp 6 (%)	Comp 7 (%)
No mosquitos coming near	0	0	1	2
Few mosquitos	0	2	1	0
Many mosquitos	2	0	0	0

[0091] The table above shows that mosquito repellence is achieved by deposition of mosquito repellent through a micro-emulsion.

Claims

1. Bi-continuous micro-emulsion detergent composition comprising :

a 40-90% by weight of a surfactant system comprising:

i 10-50% by weight of the surfactant system of a linear or branched fatty alcohol having 5-8 carbon atoms or a condensation product of a linear or branched fatty alcohol having 5-8 carbon atoms and containing not more than 5 alkylene oxide groups and mixtures thereof; and

ii a further surfactant; and

b 5-30% by weight of an aqueous solution comprising:

i water; and
ii an electrolyte, excluding surfactant system (a) **characterized in that** the aqueous solution has an ionic strength of 0.1 - 4 mol/l; and

c 5-30% by weight of an oil or solvent **characterized by** having

i a Hansen solubility of between 14 and 20 $(MPa)^{0.5}$; and
ii a solubility of solid trilaurin fatty matter into the oil of more than 3% by weight;

and further **characterized in that** the viscosity of the composition is less than 1000 mPa.s (25°C and $20s^{-1}$).

2. A composition according to claim 1 wherein the alkylene oxide is ethylene oxide.

3. A composition according to any one of the preceding claims, wherein the Hansen solubility is between 16 and 18 $MPa^{0.5}$

4. A composition according to any one of claims 1 to 3, wherein the oil is selected from essential oils, fatty acid oils, mono- di- and tri-glycerides, sugar derived polyesters and sucrose polyesters, and terpenes and mixtures thereof.

5. A composition according to any one of claims 1 to 3, wherein the solvent is selected from fatty acid alkyl esters and/or fatty alcohols preferably derived from renewable sources such as palm, coconut, soybean, with fatty acid chain length distributions from C7-C22 and alkyl chain length distributions 1-22 for the ester group and mixtures thereof.

6. A composition according to any one of the preceding claims, wherein the pH of the composition is between 5 and 9.

7. A composition according to any one of the preceding claims, further comprising a mosquito repellent agent.

8. A composition according to claim 7, wherein the mosquito repellent is selected from citrodora oil, citronella oil and lemon grass oil and mixtures thereof.

9. A composition according to any one of the preceding claims, further comprising a perfume.

10. A trigger spray dispenser comprising the composition according to any one of claims 1 to 9.

11. A stain pre-spotter device selected from stain pens, roller balls and brush pens, comprising the composition according to any one of claims 1 to 9.

12. Process for preparing a micro-emulsion according to any one of claims 1 to 9 comprising the steps in sequence of:

a adding in the surfactant system to a oil/solvent,
b mixing them together by an overhead stirrer,
c adding optional hydrophobic ingredients
d adding aqueous phase containing electrolytes.

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 10 15 2245

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 891 836 A (KACHER MARK LESLIE [US]) 6 April 1999 (1999-04-06) * column 1, line 15 - line 22; claims 1,2; example 1 * * column 2, line 14 - line 36 *	1-12	INV. C11D1/72 C11D1/83 C11D3/04 C11D3/43 C11D17/00
A	US 6 544 348 B1 (STOECKIGT DIETER [DE] ET AL) 8 April 2003 (2003-04-08) * column 1, lines 62-67; claims 1,4-5; example 1 * * column 2, lines 1-13,25-44 * * column 3, lines 39-48 * * column 4, lines 8-23 *	1-12	
A,D	WO 95/27034 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]) 12 October 1995 (1995-10-12) * page 4, line 26 - page 6, line 2; claims 1-16; examples 1-6 *	1-12	

TECHNICAL FIELDS SEARCHED (IPC)

C11D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 May 2010	Klier, Erich

CATEGORY OF CITED DOCUMENTS

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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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27-05-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5891836 A	06-04-1999	NONE	
US 6544348 B1	08-04-2003	AT 215453 T	15-04-2002
		AU 746240 B2	18-04-2002
		AU 4145199 A	20-12-1999
		CA 2332584 A1	09-12-1999
		DE 19824236 A1	02-12-1999
		DK 1082228 T3	08-07-2002
		WO 9962723 A1	09-12-1999
		EP 1082228 A1	14-03-2001
		JP 4343435 B2	14-10-2009
		JP 2002516776 T	11-06-2002
WO 9527034 A1	12-10-1995	AU 1894695 A	23-10-1995
		CA 2173137 A1	12-10-1995
		DE 69503489 D1	20-08-1998
		DE 69503489 T2	03-12-1998
		EP 0753048 A1	15-01-1997
		ES 2119405 T3	01-10-1998
		IN 184051 A1	03-06-2000

EPO FORM P0459

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 9527034 A **[0006]**
- US 5415812 A **[0007]**
- US 4438009 A **[0007]**
- US 4561991 A **[0009]**

Non-patent literature cited in the description

- **SCHWARTZ ; PERRY.** Surface Active Agents. Interscience, 1949, vol. 1 **[0031]**
- **SCHWARTZ ; PERRY ; BERCH.** SURFACE ACTIVE AGENTS. Interscience, 1958, vol. 2 **[0031]**
- McCutcheon's Emulsifiers and Detergents. **H. STACHE.** Tenside-Taschenbuch. Carl Hauser Verlag, 1981 **[0031]**