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(54) Cleaning preparations.

(57) Low viscosity, concentrated liquid detergent compositions, particularly suitable for use as laundry detergents, are provided. Said compositions comprise 2-20% by weight of dissolved builder salts and between 35% and 60% by weight total surfactant of which at least 12% by weight is mono-, di-, or triethanolamine soap, at least 5% by weight is an ethoxylated non-ionic surfactant, and the remainder is an anionic and/or amphoteric surfactant. Compositions of the present invention are especially suitable for use in automatic dosing systems for industrial and institutional applications.

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The present invention relates to novel cleaning preparations which are, stable, single phase liquids containing dissolved builders and high levels of surfactants, which afford superior laundry properties.

The compositions of the invention are not dependent for stability on the presence of solvents, which may be undesirable on cost or environmental grounds.

TECHNICAL BACKGROUND

Liquid laundry detergents have a number of advantages compared with powdered products, which have led to such liquids taking a substantial proportion of the total laundry detergent market. The introduction of compact powders containing higher concentrations of active ingredient than the traditional powders has challenged the trend towards liquids. Thus, there is a market requirement for more concentrated liquids to meet this challenge, and in particular for concentrated aqueous surfactant compositions containing dissolved or suspended builder salts, said compositions being of low viscosity.

The ability to concentrate liquid detergent has hitherto been limited by the tendency of conventional detergent surfactant systems to form mesophases at concentrations above 30% by weight, based on the weight of water and surfactant. Mesophases, or liquid crystal phases are phases which exhibit a degree of order less than that of a solid but greater than that of a classical liquid, e.g. order in one or two, but not all three dimensions.

At concentrations up to about 30% by weight, many surfactants form micellar solutions (L_1-phase) in which the surfactant is dispersed in water as micelles, which are aggregates of surfactant molecules, too small to be visible through the optical microscope. Micellar solutions look and behave for most purposes like true solutions. At about 30% concentration by weight many detergent surfactants form an M-Phase, which is a liquid crystal with a hexagonal symmetry and is normally an immobile, wax-like material. Such products are not pourable and obviously cannot be used as liquid detergents. At higher concentrations, e.g. above about 50% by weight, usually over some concentration range lying above 60% and below 80% a more mobile phase, the G-phase, is formed.

G-phases are non-Newtonian (shear thinning), normally pourable phases typically having a viscosity, cloudy, opalescent appearance and flow characteristics, which render them unattractive to consumers and unsuitable for use directly as laundry detergents.

At still higher concentrations e.g. above about 70 or 80% by weight most surfactants form a hydrated solid. Some, especially non-ionic surfactants, form a liquid phase containing dispersed micelle size droplets of water (L_2-phase). L_2 phases have been found unsuitable for use as liquid detergents because they do not disperse readily in water, but tend to form gels. Other phases which may be observed but which are unsuitable for use directly as laundry detergents include the viscous isotropic (VI) phase which is immobile and has a vitreous appearance.

The different phases can be recognised by a combination of appearance, rheology, textures under the polarising microscope, electron microscopy and X-ray diffraction or neutron scattering.

The following terms may require explanation or definition in relation to the different phases discussed in this specification: "Optically isotropic" surfactant phases do not normally tend to rotate the plane of polarisation of plane polarised light. If a drop of sample is placed between two sheets of optically plane polarising material whose planes of polarisation are at right angles, and light is shone on one sheet, optically isotropic surfactant samples do not appear substantially brighter than their surroundings when viewed through the other sheet. Optically anisotropic materials appear substantially brighter. Optically anisotropic mesophases typically show characteristic textures when viewed through a microscope between crossed polarisers, whereas optically isotropic phases usually show a dark, essentially featureless continuum.

"Newtonian liquids" have a viscosity which remains constant at different shear rates. For the purpose of this specification, liquids are considered Newtonian if the viscosity does not vary substantially at shear rates up to 1000 sec^{-1}.

The 'payload' of the composition is the percentage of ingredients, based on the total weight of the composition, which contribute to the washing effectiveness of said composition. i.e. functional ingredients, and includes surfactants, builders, optical brightners, alkaline buffers, enzymes, antiredeposition agents and antifoams.

For the purpose of this specification "an electrolyte" means any water soluble compound which is not a surfactant and which ionises in solution. Preferred are electrolytes which tend to salt a surfactant out of solution when each is present in sufficiently high concentration, which are referred to herein as "surfactant-desolubilising electrolytes".

"Soap" is used herein to mean an at least sparingly water soluble salt of a C_8-C_{22} natural or synthetic aliphatic monocarboxylic fatty acid, said salt having surfactant properties.

"Builder" is used herein to mean a compound which assists the washing action of a surfactant by ameliorating the effects of dissolved calcium and/or magnesium. Generally, builders also help maintain the alkalinity of wash liquor. Typical builders include sequestrants and complexants such as sodium tripolyphosphate, potassium pyrophosphate, trisodium phosphate, sodium citrate or sodium nitrilo-triacetate, ion exchangers such as zeolites and precipitants such as sodium or potassium carbonate and such other alkalis as sodium silicate.

Detergents for laundry use normally contain a surfactant and a builder. The latter helps the surfactant to perform much more efficiently, thereby substantially reducing the amount of surfactant required. Built liquid detergents typically contain about 5 to 15% of surfactant and 10 to 30% of builder.

In the absence of builder more than double the amount of surfactant may be required to obtain acceptable performance. Since the surfactant is considerably more expensive than the builder, the latter has been considered by some as essential to cost effective performance.

The major problem with trying to include soluble builders in liquid detergents has been that builders are electrolytes which tend to salt surfactants out of solution. The normal consequence of adding a salting-out electrolyte to an aqueous solution of an organic compound is to cause phase separation. This has commonly been observed in the case of aqueous surfactants and has given rise to a strong prejudice against adding electrolytes, even to weak concentrations of aqueous surfactant, in high enough concentrations to incur the likelihood of salting out the surfactant. In the case of more strongly concentrated aqueous surfactant solutions, there has been an even stronger prejudice against adding electrolyte in any significant amount.

THE PROBLEM

A particular requirement exists for a concentrated liquid detergent which is suitable for automatic dispensing. Such products should ideally be of low, shear independent or Newtonian viscosity, and disperse readily in water without forming intermediate gels. Such concentrated liquid detergents are especially suitable for industrial and institutional users, where the use of large volumes of detergent, and the need for efficient operation typically results in the implementation of automatic dosing systems.

PRIOR ART

Typically, commercial liquid laundry detergents fall into three main categories. The original liquid laundry detergents were aqueous surfactants, containing only low concentrations of water-soluble builder salts together with solvents and hydrotropes in order to overcome the salting out effect of any electrolyte, and maintain a stable, non-structured, isotropic, aqueous, micellar solution (L_1-phase). The performance of such products has been poor compared with powders. The performance per gram of product has been improved by formulating them at relatively high concentrations, e.g. up to 60% by weight of surfactant, by the use of more soluble, but more expensive surfactants in conjunction with sufficiently high levels of organic solvent. Because the latter do not contain high levels of builder, they have to be dosed at higher levels compared to those which have customarily been necessary for standard built products, in order to obtain comparable performance. The effect is to provide higher levels of surfactant in the wash liquor to compensate for the lack of builder. In addition, the more soluble surfactants tend to be less effective as detergents. There is therefore little benefit in terms of the bulk required, and the disadvantage of a relatively high cost per wash, exacerbated by the higher cost of soluble surfactants and the cost of solvent which is needed to maintain a homogeneous isotropic composition, but which does not contribute to wash performance. The high, but relatively ineffective, surfactant loading per wash and the presence of solvent is also disadvantageous on environmental grounds.

The development of a second type of liquid detergent resulted in an aqueous detergent composition capable of suspending solid builder, such as sodium tripolyphosphate or zeolite, in a structured aqueous surfactant system. The surfactant structure is usually formed by the interaction of dissolved electrolyte with the surfactant. The latter is salted out of the isotropic micellar phase to form a mesophase interspersed with the aqueous electrolyte. All structure surfactant systems exhibit shear dependent viscosity. Non-Newtonian viscosity is essential if the system is to be capable of suspending solid particles without risk of sedimentation, but is a disadvantage in the case of products intended for industrial and institutional use which need to be compatible with automatic dispensing systems.

The third type of detergent, and the most recent to be introduced onto the market is an anhydrous type. This has the advantage of high surfactant concentration and also the possibility of including oxidising bleach which is normally difficult to include in aqueous formulations. However, existing anhydrous formulations contain substantial amounts of organic solvent, which may be criticised on environmental grounds, and such formulations are difficult to dilute to wash liquor concentration. Addition of water tends to cause gel formation. The high concentration of surfactant can give rise to a risk of overdosing. In addition the storage stability of this type of detergent is usually poor.

THE INVENTION

An object of this invention is to provide relatively concentrated liquid laundry detergents, e.g. containing 35% or greater payload, including surfactants and dissolved builders, which are isotropic (L_1 phase) in the absence of opacifiers. A particular object is to provide such compositions which do not require the presence of environmentally undesirable solvents, or expensive stabilisers or the relatively cost-ineffective surfactants which have been required for concentrated liquid detergents hitherto.

A further object is to provide a low viscosity, non-shear thickening liquid detergent suitable for automatic dispensing, for example for use in industrial or institutional situations.

STATEMENT OF INVENTION

According to a first embodiment our invention provides a Newtonian liquid detergent composition, wherein all percentages are by weight based on the total weight of the composition, said composition comprising:

(A) from 35 to 60% of total surfactant, which includes from 12% to 55% of a mono; di- or tri-ethanolamine soap, from 0% to 43% of non-soap anionic surfactants and/or amphoteric surfactants, and 5% to 48% of non-ionic surfactant;

(B) from 2 to 20% of dissolved electrolyte consisting at least predominantly of builder salts; and

(C) at least 20% of water.

We prefer that compositions according to our invention should contain anionic sulpho surfactants. For example, at least 5% by weight of the anionic surfactant is preferably selected from alkyl benzene sulphonates, paraffin sulphonates, alkyl sulphates, alkyl ether sulphates and alkyl ether polycarboxylates. A particularly preferred combination of anionic surfactants is that of alkyl benzene sulphonates with alkyl ether sulphates. Typically the compositions contain at least 25%, more usually at least 30%, sometimes more than 36% by weight of water. Typically the compositions contain at least 3% eg. at least 5% by weight of dissolved electrolyte consisting predominantly of builder salts.

According to a second embodiment, our invention provides a liquid detergent composition, all percentages being by weight based upon the total weight of the composition, said composition comprising :-

(A) from 35 to 55% of total surfactant, comprising from 12 to 50% of a mono-, di-, or tri- ethanolamine soap, from 0 to 38% of non-soap surfactants, preferably anionic and/or amphoteric surfactants, and from 5% to 43% of non-ionic surfactants.

(B) from 2 to 20% of dissolved electrolyte consisting at least predominantly of builder salts and;

(C) at least 20% of water

We prefer that compositions according to the second embodiment, should contain anionic sulpho surfactants as the predominant proportion of any surfactants present, other than soap and non-ionic surfactants. For example, at least 5% by weight of the remaining total surfactant is selected from alkyl benzene sulphonates, paraffin sulphonates and alkyl sulphates.

Typically, the compositions contain at least 25%, more usually at least 30%, sometimes more than 36% by weight of water. Typically, the compositions contain at least 3%, eg. at least 5% by weight of dissolved electroylte consisting predominantly of builder salts.

According to a third embodiment, the products of this invention comprise, in percentages by weight, from 2 to 20% of an alkyl benzene sulphonate, from 0 to 15% of an alkyl ether sulphate; from 15 to 40% of soap; from 5 to 15% non-ionic alkoxylated surfactants; from 2 to 20% of total dissolved electrolyte comprising from 2 to 10% citrate, from 0 to 10% carbonate and from 0 to 4% phosphonate; and from 30 to 60% water. The cationic components of the anionic surfactants and other salts preferably comprise at least 10% of mono, di- or tri-ethanolamine and the balance substantially an alkali metal ion.

According to a fourth embodiment, the present invention provides clear, homogeneous, low viscosity, non-shear dependent liquids, typically having a viscosity of less than 0.6 Pa s at 20 °C, wherein said compositions are suitable for automatic dosing.

THE SOAP

The proportion of soap is preferably 8 to 20% expressed as weight % fatty acids, by weight of the composition, e.g. 10 to 15%. The total proportion of soap expressed by weight of soap based on the total weight of the Composition is preferably 15-40% by weight, most preferably 18-35% by weight, e.g. 20-32% by weight.

The cationic component of the soap preferably comprises mono-, di- or tri-ethanolamine, preferably a mono- or di- ethanoloamine in a proportion between 7 and 25% by weight of the composition, more preferably 9 to 20% especially 10 to 15%, with the balance being substantially an alkali metal ion, preferably sodium and/or potassium.

The natural and synthetic acids which may be used to produce the soap are preferably C_8-C_{22} saturated or unsaturated, straight or branched chain fatty acids including lauric, myristic, palmitic, stearic, arachidic, palmitoleic, oleic, ricinoleic, linoleic and arachidonic.

Especially preferred are the mono- or diethanolamine salts of C_8-C_{20} fatty acids, for example the monoethanolamine salt of palm kernel fatty acid.

The soap may be added to the composition as a preformed soap or may be formed in situ by the reaction of the fatty acid with an appropriate base.

ANIONIC/AMPHOTERIC SURFACTANTS

The compositions of the present invention typically contain anionic and /or amphoteric surfactants in a proportion of total surfactant of up to 43% by weight, preferably 5% to 30% by weight, eg. 5% to 25% by weight.

The anionic surfactant preferably comprises a C_{10-18} eg. C_{10-14} alkyl benzene sulphonate e.g. in a total proportion of at least 5%, preferably 5 to 20% especially 5 to 15% most preferably 10 to 14% by weight. The anionic surfactant may if desired alternatively or additionally comprise a C_{10-18} e.g. C_{10-14} alkyl polyoxyethylene sulphate having an average of from 1 to 20, preferably 2 to 4 ethoxy groups per molecule, in a proportion of at least 2%, preferably 5% to 10% by weight. A particular advantage of the addition of such alkyl polyoxyethylene sulphates is that the payload of said compositions may be increased, and thus performance improved, without adversely affecting the properties of said compositions.

Other anionic surfactants which may be present include C_8-C_{22} paraffin sulphonates and C_8-C_{22} alkyl sulphates, and C_8-C_{22} alkyl ether polycarboxylates having between 1 and 50 ethyleneoxy groups per molecule preferably 2-20 ethyleneoxy groups per molecule.

The surfactant may optionally, but preferably, comprise a minor amount, e.g. up to 5%, preferably 1 to 2% of amphoteric surfactant. The preferred amphoterics are C_{8-18} alkyl dimethyl betaines. Other amphoterics include amido amine betaines, alkyl imidazoline betaines and sulphobetaines.

NON-IONIC SURFACTANTS

The non-ionic surfactant is preferably an ethoxylated C_{8-20} eg. C_{10-14} alcohol having an average of from 5 to 50, preferably 6 to 20, most preferably 6 to 10 ethyleneoxy groups per molecule. Other non-ionic surfactants include ethoxylated C_{8-20} fatty acids having the same preferred proportion of ethylene oxide and mixed ethoxylated propoxylated analogues of the aforesaid non-ionic surfactants having a ratio of propyleneoxy to ethyleneoxy groups between 0 and 0.5. The surfactant may include an amine oxide, usually in a proportion up to 1%, or higher if low foaming characteristics are not important. Other non-ionic surfactants include fatty alkyl mono- and di-ethanolamides.

The proportion of non-ionic surfactant is between 5% and 48% by weight of the composition, preferably between 7% and 35%, e.g. between 9% and 20%, such as between 10% and 15%.

The total weight % of surfactant is desirably 31 to 59% e.g. 40 to 55% especially 48 to 52%, based on the total weight of the composition.

ELECTROLYTES

The total proportion of dissolved electrolyte is preferably 7 to 15% by weight of the composition. The electrolyte preferably comprises citrate and carbonate and optionally up to 4% of a phosphonate such as an aminotris (methylene phosphonate), ethylene diamine tetrakis (methylene phosphonate) or diethylene triamine pentakis (methylene phosphonate). We prefer that the composition contains at least 5% citrate and at least 2% carbonate by weight. The compositions may optionally contain minor proportions eg. up to 5%,

preferably up to 2% of acetate.

Electrolytes which may be present include such builders as silicates, nitrilotriacetates, pyrophosphates and ethylene diamine tetracetates, as well as other salts such as chlorides, bromides, formates, acetates and nitrates or buffers such as borates.

For cost reasons, we prefer to use sodium salts where possible although it is generally desirable to include some potassium salts in the electrolyte to obtain lower viscosities. Lithium and caesium salts have also been tested successfully, but are unlikely to be used in commercial formulations.

It is possible to include phosphates and/or condensed phosphates, such as sodium hexametaphosphate, potassium pyrophosphate or sodium or potassium tripolyphosphate. Phosphonates, such as acetodiphosphonic acid salts or amino tris (methylenephosphonates), ethylene diamine tetrakis (methylene phosphonates) and diethylene triamine pentakis (methylene phosphonates), may also be used.

The electrolyte may be present in concentrations up to saturation, but we prefer that any non-functional component should not exceed its saturation concentration at 0ºC. For this reason the electrolyte should preferably not contain substantial proportions e.g. more than 2% by weight of sodium sulphate. Preferably the sodium sulphate content is below 1% by weight. The total dissolved electrolyte concentration is typically between 2 and 20% by weight, more usually 4 to 18% e.g. 6 to 17% based on the total weight of the composition. In particular we prefer that compositions of our invention should contain at least 2%, preferably at least 3%, more preferably at least 5%, most preferably at least 6%, especially at least 7%, sometimes at least 8% by weight of dissolved builder.

Apart from the ethanolamine, the balance of cations in the solution are preferably alkali metal more preferably sodium and/or potassium, especially sodium and potassium in atomic ratio of from 0.5:1 to 1:0.1.

MINOR INGREDIENTS AND WATER

We prefer that compositions of our invention contain a minor amount, e.g. up to 2%, preferably 0.1 to 1% of a hydrotrope such as a lower alkyl benzene sulphonate e.g. sodium xylene sulphonate, sodium cumene sulphonate or sodium toluene sulphonate.

Compositions of our invention are preferably substantially free from solvents, which are not required for maintaining homogeneity and further, are environmentally undesirable. However, it is sometimes desired to include a small amount of volatile hydroxylic solvent such as ethanol (typically as industrial methylated spirits) as a perfume enhancer. Quantities up to 10% can be included, but less than 3%, e.g. less than 2.5% by weight are preferred.

Compositions according to the invention typically include the usual minor ingredients such as perfume, colouring, optical brighteners, opacifiers, preservatives or enzymes, antiredeposition agents, or other polymers in conventional amounts.

The compositions typically contain 20 to 60% by weight water, e.g. 30 to 50%, more usually 32 to 45%.

PREPARATION

In formulating the compositions of the invention the ingredients are mixed until a clear homogeneous liquid phase is obtained. If the composition tends to separate to give an opalescent G-phase layer, it should be diluted with a little water and/or ethanolamine until a stable, clear, single-phase composition has been obtained.

VISCOSITY

The formulations of the present invention are low viscosity Newtonian liquids. Typically, the viscosity at 20 °C of such compositions is less than 0.6 Pa s and greater than 0.03 Pa s, preferably between 0.05 Pa s and 0.5 Pa s between 0.12 Pa s and 0.35 Pa s, as measured at $21S^{-1}$ shear rate by a controlled stress rheometer.

The compositions of the present invention are non-shear dependent Newtonian liquids which are easily dispensed by automatic dosing equipment.

EXAMPLES

The invention is illustrated by the following examples given in table 1, in which all proportions are expressed as percentages by weight, based on the total weight of the composition:

Table 1

Examples				
	Example No			
	1	2	3	4
Refined palm kernel fatty acid	13.5	13.5	13.5	13.5
Sodium C_{10-14} alkyl benzene sulphonate	13	13	13	13
Monoethanolamine	-	-	11	13
Triethanolamine	13	11	-	-
C_{12-14} alcohol 8-mole ethoxylate	11.5	11.5	11.5	11.5
C_{10-14} alkyl dimethyl betaine	1	1	1	1
Potassium citrate monohydrate	5	5	5	5
Potassium carbonate	2	2	2	2
Sodium diethylenetriamine pentakis methylene phosphonate)	1	1	1	1
Sodium xylene sulphonate	0.6	0.6	0.6	0.6
Calcium acetate	0.1	0.1	0.1	0.1
Optical brightener ("TINOPAL" CBS/X RTM)	0.2	0.2	0.2	0.2
Enzymes	0.5	0.5	0.5	0.5
Industrial Methylated Spirit	-	2	2	-
Perfume, dyes, preservative, polymer (total)	1.2	1.2	1.2	1.2
Water	37.4	37.4	37.4	37.4

The compositions of examples 1 and 2 were clear, homogeneous, isotropic liquids having a 1% solution pH of 8, a setting temperature at about -5ºC and viscosity at 21 sec^{-1} and 20ºC of 0.3 Pa s and 0.2 Pa s respectively.

The compositions of examples 3 and 4 were also clear, homogeneous, isotropic liquids having a 1% solution pH of 10.0, a setting temperature at about - 5 °C and a viscosity at 21 s^{-1} and 20 °C of 0.13 Pa s for example 3.

The compositions of examples 1 to 4 all gave excellent stain and soil removal on test cloths after washing under definite conditions in a standardised washing machine at 40 °C and 60 °C, at 200 ppm artificial total water hardness (calcium and magnesium hardness). The degree of whiteness of the fabric, after treatment with said compositions was determined by reflectance measurement.

Method for the evaluation of soil and stain removal by detergent compositions

1. Two 3 inch square pieces of each standard pre-stained or pre-soiled test cloth (detailed below) were washed together at 40 °C or 60 °C in a standardised automatic washing machine, with 120mls (8.8grams per litre of wash water) of example 2 or a currently available, leading commercial brand laundry detergent. The currently available laundry detergent was used as a standard. Calcium chloride and magnesium carbonate were used to dose the washing water to achieve a total artificial water hardness of 200 parts per million (of calcium and magnesium hardness). After the washing cycle was completed, the test clothes were rinsed in hardness adjusted water, and allowed to air dry.

2. After air drying and ironing, two light reflectance readings were taken from different areas on each side of every cloth, using a Minolta light reflectance meter (model CR200). The eight light reflectance readings thus obtained for each standard cloth were averaged and converted to percentage soil or stain removal by the formula given below :

$$\% \text{ soil or stain removal} = \frac{W_1 - W_2}{W - W_2} \times 100$$

where:

W is the reflectance reading of unsoiled fabric of the correct type.

W_1 is the reflectance reading of the laundered fabric.

W_2 is the reflectance reading of soiled/stained fabric.

Standard soiled and stained cloths were supplied by the 'Swiss Federal Laboratories for materials testing and research - Switzerland' and by Washereiforfehung Krefeld (WFK) - Germany. The cloths used for evaluation as hereinabove described are recognised as standard test cloths throughout the detergent industry. Tea, coffee and blackcurrant juice test cloths were prepared in-house, by manual staining of cloth. The test fabrics are measured for reflectance values before and after laundering.

Each standard cotton cloth was pre-soiled with one of the following mixtures :-

a) carbon/olive oil

b) carbon/wool grease

c) pigment/sebum

Each standard polycotton cloth was pre-soiled with one of the following mixtures :-

a) carbon/olive oil

b) pigment/sebum

The standard polyester cloth was pre-soiled with a mixture of pigment/sebum

The standard pre-stained cloths were all cotton, and were pre-stained either with a bleachable stain (tea, coffee, blackcurrant juice or red wine) or with an enzymatic stain (blood/milk/carbon).

Table 2: Evaluation results for soil and stain removal under standardised test conditions for example 2 and a commercially available laundry product

Total artificial water hardness - 200ppm (Calcium and magnesium hardness)

dosage = 120ml (8.88g\l of wash water)

	Example 2		Standard	
Soil Removal	**40° C**	**60° C**	**40° C**	**60° C**
cotton	39.3%	59.3%	39.3%	59.3%
polycotton	30.7%	46.7%	32.7%	49.3%
polyester	33.3%	38.0%	33.3%	32.0%
total soil removal	103.3	144.0	105.3	140.6

Stain Removal

	Example 2		Standard	
	40° C	60° C	40° C	60° C
biological stains	34.0%	52.0%	36.0%	48.7%
bleachable stains	55.3%	65.3%	57.3%	61.3%
total stain removal	89.3	117.3	93.3%	110.0
TOTAL SOIL/STAIN REMOVAL @ 40/60° C	453.9		449.2	

It can be seen from the above evaluation results of soil and stain removal performance, that example 2 provided an equivalent performance to that of a currently available leading commercial brand product. Both products have been evaluated under the same standardised test conditions.

However, the currently available commercial product contains a significant proportion of solvent. Therefore, the examples of the present invention provide equivalent soil and stain removal performance upon standard test cloths, under standardised conditions, but without the need for environmentally undesirable solvents.

Claims

1. A liquid detergent composition, wherein all percentages are by weight based on the total weight of the composition, said composition comprising :-
   (A) from 35 to 60% of total surfactant, which includes from 12% to 55% of a mono; di- or tri-ethanolamine soap, from 0% to 43% of non-soap anionic surfactants and/or amphoteric surfactants, and 5% to 48% of non-ionic surfactant;
   (B) from 2 to 20% of dissolved electrolyte consisting at least predominantly of builder salts; and
   (C) at least 20% of water.

2. A liquid detergent composition, wherein all percentages are by weight based on the total weight of the composition, said composition comprising:-
   (A) from 35 to 55% of total surfactant, comprising from 12 to 50% of a mono-,di-, or tri-ethanolamine soap, from 0 to 38% of non-soap anionic and/or amphoteric surfactants, and from 5% to 43% of non-ionic surfactants.
   (B) from 2 to 20% of dissolved electrolyte consisting at least predominantly of builder salts and;
   (C) at least 20% of water

3. A liquid detergent composition, wherein all percentages are by weight based upon the total weight of the composition, said composition comprising:-
   (a) at least 20% of water,
   (b) from 2% to 20% of an alkyl benzene sulphonate,
   (c) from 0% to 15% of an alkyl ether sulphate,
   (d) from 15% to 40% of a mono-, di or triethanolamine soap,

(e) from 5% to 15% of non-ionic alkoxylated surfactants,
and
(f) from 2% to 20% of total dissolved electrolyte, said dissolved electrolyte comprising:
(i) from 2% to 10% citrate,
(ii) from 0% to 10% carbonate,
and
(iii) from 0% to 4% phosphonate.

4. A liquid detergent composition according to any preceeding claim containing from 5 to 30% of said other non-soap anionic surfactants comprising, C_8-C_{18} alkyl benzene sulphonates, C_8-C_{22} paraffin sulphonates, C_8-C_{22} alkyl sulphates, C_8-C_{22} alkyl ether polycarboxylates and/or C_{10}-C_{18} alkyl polyoxyethylene sulphates.

5. A liquid detergent composition according to claim 4, wherein the non-soap anionic surfactant comprises C_{10}-C_{14} alkyl benzene sulphonates.

6. A liquid detergent composition according to any foregoing claim wherein the soap is a salt of a C_8-C_{22} saturated or unsaturated, straight or branched chain, natural or synthetic fatty acid.

7. A liquid detergent composition according to claim 6, wherein the concentration of soap is at least 12% by weight, based on the weight of soap in the total composition.

8. A liquid detergent composition according to claim 7, wherein the total concentration of soap is 15% - 40%.

9. A liquid detergent composition according to any foregoing claim wherein the non-ionic surfactant comprises an ethoxylated C_8-C_{20} alcohol or fatty acid having an average of from 5 to 50, ethyleneoxy groups per molecule.

10. A liquid detergent composition according to claim 9 wherein the proportion of non-ionic surfactant is between 7% and 35% of the total composition.

11. A liquid detergent composition according to any foregoing claim comprising from 0.5% to 5% of amphoteric surfactant.

12. A liquid detergent composition according to claim 11 wherein the amphoteric surfactant comprises C_8-C_{18} alkyl dimethyl betaine, amido amine betaine, alkyl imidazoline betaine and/or sulphobetaine, preferably C_8-C_{18} alkyl dimethyl betaine.

13. A liquid detergent composition according to either of claims 1 and 2 wherein the dissolved electrolyte is a water soluble citrate, and/or carbonate and/or phosphonate.

14. A liquid detergent composition according to any foregoing claim wherein said dissolved electrolyte comprises at least 5% citrate and at least 2% carbonate, and optionally up to 4% by weight of phosphonate.

15. A liquid detergent composition according to any foregoing claim containing 7 to 15% of dissolved electrolyte.

16. A liquid detergent composition according to any preceding claim containing conventional amounts up to 5%, of hydrotropes, opacifiers, perfume, colouring, optical brighteners, preservatives, enzymes, anti-redeposition agents and/or other polymers.

17. A liquid detergent composition according to any preceding claim having Newtonian flow characteristics and a viscosity of between 0.03 Pa s and 0.6 Pa s at 20 °C.

18. A liquid detergent composition according to any preceding claim for use as a laundry detergent.

19. A liquid detergent composition according to any preceding claim for use with an automatic metering system.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 11 6236

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	EP-A-0 490 040 (HÜLS AG.)	1,2, 4-10,13, 16,18	C11D17/08 C11D10/04
A	* the whole document *	3,14,15, 17	
X	EP-A-0 201 016 (HENKEL KGAA.)	1-10,16, 18	
	* the whole document *		
X	EP-A-0 104 434 (HENKEL KGAA.)	1,2, 6-10,13, 16,18	
A	* the whole document *	3,14	
X	DE-A-40 28 850 (JOHANNES KIEHL KG.)	1,2,4-7, 9,10,13, 16-18	
	* the whole document *		
A	US-A-4 507 219 (HUGHES)	1-10, 13-16,18	TECHNICAL FIELDS SEARCHED (Int.Cl.5)
	* claims 1-8 *		C11D
A	FR-A-2 545 353 (COLGATE - PALMOLIVE CO.) * claims *	1,11,12	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 January 1994	Serbetsoglou, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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