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Remarks:

Claims 17 - 22 are deemed to be abandoned due to non-payment of the claims fees (Rule 45(3) EPC).

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(54) **Hand dishwashing composition with improved foaming properties**

(57) The present invention relates to liquid hand dishwashing compositions. Particularly the present invention relates to hand dishwashing compositions with improved foaming properties. The foam produced by applying compositions of the present invention has long lasting duration which is desirable by the user. Moreover in the present invention persistency of foam is existent in oil containing soil dishwashings which is a desirable property by the user. The compositions of the present invention are high concentrated and economically favourable.

This task has been accomplished by the present inventor by developing new, unique compositions specifically designed for fulfilling said requirements. More specifically the present invention is about compositions comprising sodium lauryl ether sulfonate, amineoxide compounds, betain compounds and organic solvent in specific ranges. The present invention provide high concentrated and economically feasible liquid hand dishwashing compositions with high foam duration thus fulfilling the need in the field.

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**Description**

**FIELD OF THE INVENTION**

- 5 [0001] The field of the present invention is liquid hand dishwashing compositions.  
 [0002] This application relates to dishwashing compositions with high foam duration capabilities. This application relates to liquid hand dishwashing compositions with high foaming height in presence of oil.  
 [0003] This application relates to liquid hand dishwashing compositions with high active agent content.  
 [0004] This application relates to effective and economically feasible liquid hand dish washing compositions.  
 10 [0005] Particularly this application relates to the specific compositions to fulfill all the said requirements and fulfill the need in this particular field.  
 [0006] To the present invention related compositions are more effective thus appealing more to the customer due to desired long lasting foaming power and economic feasibility.

15 **BACKGROUND OF THE INVENTION**

- [0007] Dishes are washed in many parts of the world still manually due to convenience or mostly economical reasons and this fact seems not to be changed in the near future.  
 [0008] Aids for hand dishwashing are detergents of gel or mostly liquid form.  
 20 [0009] Hand dishwashing detergents remove food soils, hold soil in suspension and provide long lasting suds that indicate how much cleaning power is left in the wash water.  
 [0010] High foaming capacity of hand dishwashing detergents is a desired property. Foaming is an indication of cleaning strength. High foaming properties show that detergent composition has still its cleaning capabilities especially with regard to soil and oil removing.  
 25 [0011] Another aspect of the foaming capability is the duration of the foam which influence cleaning effectiveness as well. Long duration of foam provides enhanced cleaning strength of the hand dishwashing cleaning composition.  
 [0012] Commercially available classical hand dishwashing compositions are containing linear alkyl benzene sulphonic acid sodium salt; LABSA. These compositions create big bubbles but they perish after short period of time which is not desirable by the customer.  
 30 [0013] Several hand dishwashing compositions are known in the prior art targeting the subject matter such as, CA2237694 Amway teaches us liquid dishwashing detergent composition comprising using various surfactant in presence of a hydrotrope. Said hydrotropes are fatty acid and its esters. Alcohols are intentionally avoided due to specific drawbacks like flammability among others. US5990065 Procter and Gamble teaches us hand dishwashing detergent compositions having provided by using various type of surfactants used in presence of earth alkaline metals and diamine.  
 35 These compositions have accordingly improved grease removal performance and benefits in sudsing. But diamine compounds potential hazardousness seem to be an apparent drawback.  
 [0014] WO9404640 Burdon Allan teaches use of high concentration of high loaded ethoxylated alkyl ether sulphonate which further comprise earth alkaline salts and alcohol. Very high content of actives is disadvantageous for aimed hand dishwashing compositions of present inventions.  
 40 [0015] None of the in prior art literature mentioned compositions meet the by customer desired hand dishwashing product owing high foam durability and high load properties.  
 [0016] Conclusively, there is a need and desire to have hand dishwashing compositions with improved foaming behaviour and use comfort.

45 **BRIEF DESCRIPTION OF DRAWINGS:**

[0017]

50 FIGURE 1: Foam Duration Tests Diagram of Example 1, Example 2, Example 3 and Comparative Example 1. (0.4 gram of cleaning composition is mixed with 500 ml of water, 50 ml of this mixture is stirred in Kruss DFA Device cylinder for 120 sec and stopped and waited. Diagrams are showing foam heights corresponding to respective time passed).

FIGURE 2: Foam Height in Presence of Oil Tests Diagram of Example 1, Example 2, Example 3 and Comparative Example 1. (4 gram of cleaning composition in 500ml water mixed, 40ml taken, 0.25 ml IKW oil part is added \*, 120 sec in KRUSS DFA Device stirred, stopped, 60 sec waited and foam height measured).

\*(Corresponding to 3.215 ml of IKW Standard oil/500 ml water. For Standard oil content and details see in Tests chapter 2: Foam height test in presence of oil).

## DISCLOSURE OF THE INVENTION

[0018] The present invention relates to new dishwashing compositions which are superior to commercially available products on the market with regard to foaming potency.

[0019] By the search of favourable compositions, the present inventor encountered unexpectedly with compositions which have improved foaming properties.

[0020] More precisely the present inventor have found liquid hand dishwashing compositions having foam of high duration.

[0021] Commercially available liquid hand dishwashing products are containing predominantly LABSA as main active agent. LABSA is the synonymous for Linear Alkyl Benzene Sulfonic Acid. This compound is used as its alkali metal salt preferably as its sodium salt, belonging to the group of anionic surfactants with regard to its functionality and structure. It has good foaming capability with big bubbles. But their duration is of short period of time.

[0022] The customer of hand dishwasher prefer the presence of foam during the whole periode of dishwashing process. This imply to the costumer the existence of washing strength. Lack of foam appear as water without active agent. Therefore long lasting foam presence, preferably until the end of the dishwashing process is desired.

[0023] By the search of compositions with improved foaming properties there appeared to be necessary to apply not lone actives for this purpose but combinations of the ingredients.

[0024] The present inventor surprisingly found that anionic surfactant, foam booster compound, amphoteric surfactant, organic solvent and water comprising compositions show the desired long lasting foaming behaviour.

[0025] Particularly the present inventor found that sodium lauryl sulfate as anionic surfactant, amine oxide compound as foam booster, betain compound as amphoteric surfactant, alcohol as organic solvent and water comprising compositions show the desired long lasting foaming behaviour.

[0026] More particularly the present inventor found that sodium lauryl sulfate ether containing one ethoxy group, cocodimethyl amine oxide, cocoamido propyl betaine, ethanol and water comprising compositions show the desired long lasting foaming behaviour.

[0027] The by the present inventor found composition is unique, good working and superior to the marketed products with respect to foam durability.

[0028] Additionally, this compositions are superior to the existing LABSA or LAS, Long Alkyl Sulfonate containing marketed products with respect to skin compatibility. LABSA and LAS are known skin irritants. They are replaced in the present invention with sodium lauryl sulphate ether which is less irritant. Additionally added cocoamido propyl betaine contribute to the dermatological improvement of the composition and decrease irritation. Additionally to that the combination of SLES with cocoamido propyl betaine decrease the amount of SLES necessary for the present invention which contributes to skin compatability additionally.

[0029] Using less SLES contribute to a possible high effective composition with less active agent. Therefore this combination of composition is unique, good working and effective in many aspects.

[0030] In a hand dishwashing liquid certain characteristics are important namely, lasting suds, effective cleaning performance, pleasant fragrance and appearance. To meet these criteria following basic ingredients are used.

[0031] Surfactants are primary ingredients in a liquid hand dishwashing detergent. Often a combination of surfactants is used to produce good grease cutting capability, soil suspension and stable sud levels.

[0032] Stability and dispensing aids are added to keep the product homogeneous under varying storage conditions. Hydrotropes and salts are often used.

[0033] Preservatives are added if needed in small amounts to help prevent any microbiological growth in the product.

[0034] An important difference in the quantity of liquid hand dishwashing detergent required is the concentration of the surfactants versus water in a product. More concentrated products are more efficient and may be more economical to use than the more dilute ones. Concentrated products are more economical with respect to packaging, transport, production and storage.

[0035] Suds generation is an important signal to the costumer that a hand dishwashing detergent is effective in removing soils and in particular, greasy oily residues.

[0036] As cleaning demand on the surfactant system increases in hand dishwashing, the suds level drops due to antifoam effect of particulates and grease. To mitigate this sudsing loss, weakly cationically charged polymers were investigated to stabilize and boost suds via interacting with greasy soils, thereby reducing soil anti-foam effects. But most of these polymers had several significant compatibility issues with liquid hand dishwashing detergents.

[0037] Sodium Lauryl Sulfate, SLS and Linear Alkyl Sulfate, LAS are primary surfactants added to classical dishwashing compositions but with decrease of foam height consequences. Exemplarly LABSA containing compositions foam decrease according to the tests of inventor within less than 1 minute considerably, which is not desireable by the hand dishwashing user. In comparison present invention compositions foam do not deflate before 3 minutes.

[0038] In the present invention modification of the formula by replacing LAS with SLES preferably containing 1 ethoxy group, showing an improvement in the foam stability by measured foam height.

**[0039]** In the present invention modification of in classical hand dishwashing compositions used lauramine oxide by replacing with cocamidopropyl betaine the initial foam height remained almost the same. Corresponding lauramine oxide containing compositions foam height is decreasing with time. That means cocoamidopropyl betaine is a better secondary surfactant in a SLES formula than lauramine oxide. SLES gives better foam stability than LAS as well.

**[0040]** The present invention may contain following ingredients;

**[0041]** Anionic surfactants used in the dishwashing compositions of the present invention comprise sulfate surfactants, sulfosuccinate surfactants, alpha olefin sulfonate surfactants, sulfonate surfactants and mixtures thereof.

**[0042]** Preferably anionic surfactant of the present invention is comprising sodium lauryl ether sulfate, sodium alkyl glyceryl ether sulfonate, alcohol ether sulfate, alkyl ethoxy sulfonate.

**[0043]** More preferably anionic surfactant of the present invention is comprising of alkyl ethoxy sulfonate surfactants having average ethoxylation degree from 0.01 to 10, preferably from 0.02 to 4 and more preferably from 0.03 to 3.

**[0044]** Most preferably anionic surfactant of the present invention is selected from sodium lauryl ether sulfonate with 1-6 ethoxy groups, more preferably with 1 ethoxy group.

**[0045]** Compositions of the present invention comprise 10% to %30 preferably 12% to %24 of anionic surfactant.

**[0046]** Amphoteric surfactants used in the liquid hand dishwashing compositions of the present invention comprise alkyl dimethyl betaine, alkyl carbo betaine, alkyl sulfo betaine, alkyl hydroxysulfobetaine, alkylamideamine-type betaine and alkylimidazoline-type betaine.

**[0047]** Preferably amphoteric surfactant of the present invention is comprising alkyl amidopropylbetaine, N,N-dimethylacetic acid betaine, alkylamidepropyl-N,Ndimethyl-2-hydroxypropylsulfobetaine, alkylamidepropyl N, N-dimethylpropylsulfobetaine, lauramide propyl- N,N-dimethylacetic acid betaine, myristamidepropyl-N, N-dimethylacetic acid betaine, Cocamidepropyl-N,N-dimethylacetic acid betaine and the like.

**[0048]** Most preferred amphoteric surfactant of the present invention is cocamidepropyl-N,N-dimethylacetic acid betaine.

**[0049]** Said betaines are particularly preferable in terms of detergency, foam producing ability and rinsing property.

**[0050]** In the present invention, the above-mentioned amidobetaine-type amphoteric surfactants can be used singly or in combination of two or more. They are incorporated in amounts of 1% -15% by weight. When the amount of amidobetaine type amphoteric surfactant is less than 1%, sufficient detergency cannot be obtained. On the other hand, amounts exceeding 15% are not economical, because the effects of the amphoteric surfactants are saturated and cannot be enhanced any more.

**[0051]** Compositions of the present invention comprise 1% to %15 prefferably 1% to %8 of said betaine compound(s).

**[0052]** Foam boosting compounds used in the present invention comprise amine oxide such as alkyl- or alkenyl- amine oxides having a linear or branched alkyl or alkenyl group having 1 to 24 carbon atoms.

**[0053]** Preferably amine oxide compounds used in the present invention is comprising, lauryl amido propyl amine oxide, myristal amido propyl amine oxide, lauryl dimethyl amine oxide, alkyl dimethyl amine oxides, cocodimethyl amine oxide, alkyl dihydroxyethyl amine oxide, coconut allyl dimethyl amine oxide, cocoamidopropyl amine oxide and cocoamide diethanolamide.

**[0054]** Most preferably used foam boosting compound of the present invention is cocodimethyl amine oxide.

**[0055]** Said compounds add foam enhancement and stability, emulsification and viscosity building properties to the compositions of present invention.

**[0056]** Compositions of the present invention comprise 1% to %15 prefferably 2% to %12 of amine oxide compound.

**[0057]** Solvents are needed for preventing phasing out the composition and to dissolve some ingredients. Additionally by hand dishwashing compositions they add to the rinsing properties of the composition by dripping out the water from surface of dishes, avoiding water and mineral stains on dishes and providing short drying times.

**[0058]** Organic solvents are the main solvents used for this purpose and comprise for the present invention ethanol, propanol, isopropanol, butoxy propoxy propanol, butoxy propanol, butoxy ethanol, , butyl diglycoether, benzyl alcohol, propoxy propoxy propanol, polypropylene glycol, ethers and diethers, alkoxyated glycols, C6-C16 glycol ethers, aliphatic branched alcohols, alkoxyated aliphatic alcohols, alkoxyated linear C1-C5 alcohols, linear C1-C5 alcohols and mixtures thereof.

**[0059]** Preferred solvents of the present invention are ethanol, isopropanol, glycol, glycerin, polyethylene glycol, most prefferable ethanol.

**[0060]** Used solvent amounts in the present invention may vary between 0.01% to 25% prefferably 1% to 10%.

**[0061]** Surfactants interact with skin by binding to skin protein and causing swelling. An example is sodium lauryl sulfate SLS which is limiting its use by hand dishwashing detergents. A solution to this problem constitute use of mild surfactants, use of ethoxylated alcohols and skin compatibility agents which is provided by the present invention.

**[0062]** Preservatives which can be optionally used in the present invention compositions at a concentration of 0 % to 3 % weight percentage comprise benzalkonium chloride, benzethonium chloride, sodium benzoate, 5-bromo-5-nitro-1,3 dioxane, 2-bromo-2-nitropropane-1, 3-diol, alkyl trimethyl ammonium bromide; N- (hydroxymethyl)-N- (1, 3-dihydroxy methyl-2, 5-dioxo-4-imidaxolidinyl-N'- (hydroxy methyl) urea; 1-3-dimethylol- 5, 5-dimethyl hydantoin; formaldehyde;

iodopropynyl butyl carbamate, butyl paraben; ethyl paraben; methyl paraben; propyl paraben, mixture of methyl isothiazolinone/methyl-chloroisothiazoline; mixture of phenoxyethanol/butyl paraben/methyl paraben/propylparaben; 2-phenoxyethanol; tris- hydroxyethyl-hexahydrotriazine; methylisothiazolinone; 5-chloro-2-methyl-4-isothiazol- 3-one; 2-methyl-4-isothiazol- 3-one ; 1,2-dibromo-2,4-dicyanobutane and mixtures thereof.

5 **[0063]** Preferred preservative of the present invention is mixture of 5-chloro-2-methyl-4-isothiazol-3-one and 2-methyl-4-isothiazol- 3-one.

**[0064]** Further, compositions of the present invention may contain builder which act as a complexation agent as well, such as ethylene diamine tetra acetic acid (EDTA) and its salts. Preferred salts are alkali salts most preferred tetrasodium salt of EDTA. Polycarboxylated organic acids like citric acid and its salts may be used for complexation purposes as well beside polyphosphate and polyacrylate among others.

10 **[0065]** PH adjusting agents of basic nature such as sodium hydroxide, potassium hydroxide, alkali metal hydroxide, alkali metal carbonate, bicarbonate may be added to the present invention compositions.

**[0066]** PH adjusting agents of of acidic nature, organic acids such as citric acid, fumaric acid, inorganic acids such as hydrochloric acid and sulfuric acid may be added to the present invention compositions.

15 **[0067]** Further, salts may be added to the compositions of the present invention. Said salts may be organic or inorganic nature such as sodium chloride, magnesium sulfate, calcium chloride, sodium citrate, sodium sulfate among others.

**[0068]** Furthermore fragrance, perfume, hydrotropes, dye, thickening agents among others may be added to the present invention compositions.

20 **[0069]** The following examples are given by way of illustration and therefore should not be construed to limit the scope of the present invention.

**COMPARATIVE EXAMPLE 1**

25 **[0070]**

	Linear Alkyl Benzene Sulfonic Acid Sodium Salt (LABSA)	16.8
	Sud Caustic (49% aq. NaOH)	4.2%
	Magnesium sulfate	0.6%
30	Sodium Lauryl Ether Sulfonate (SLES, 2 Ethoxy)	5%
	Cocodimethylamine oxide	0.0%
	Cocoamidopropyl betaine	0.0%
	*Parmetol A-28 S (Preservative)	0.1
	Ethylalcohol	0.0%
35	NaCl	1%
	Water	73%

**EXAMPLE 1**

40 **[0071]**

	Sodium Lauryl Ether Sulfonate (SLES, 1 Ethoxy)	20%
	Cocodimethylamine oxide	7.2%
45	Cocoamidopropyl betaine	4.2%
	*Parmetol A-28 S (Preservative)	0.1%
	Ethyl alcohol	3%
	NaCl	0.25%
	Na4EDTA	0.1%
50	Water	64%

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\*Parmetol A-28 S: mixture of 5-Chloro-2-Methyl-2H-isothiazol-3-one and 2-Methyl-2H-isothiazol-3-one

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55 **[0072]** Ingredients are added in the order listed with continuous mixing until a clear, smooth and homogenous batch is obtained that is free of lumps and particles. pH is adjusted with sodium hydroxide and or sodium citrate to 8.5 +/- 0.5.

EXAMPLE 2

[0073]

5	Sodium Lauryl Ether Sulfonate (SLES, 2 Ethoxy)	10%
	Cocodimethylamine oxide	0.0%
	Cocoamidopropyl betaine	5.75%
	*Parmetol A-28 S (Preservative)	0.1%
10	Ethyl alcohol	0.0%
	NaCl	0.25%
	Na4EDTA	0.1%
	Water	84%

15 EXAMPLE 3

[0074]

20	Sodium Lauryl Ether Sulfonate (SLES, 2 Ethoxy)	18%
	Cocodimethylamine oxide	7%
	Cocoamidopropyl betaine	4.2%
	*Parmetol A-28 S (Preservative)	0.1%
	Ethyl alcohol	0.0%
25	NaCl	1%
	Na4EDTA	0.2%
	Water	69%

30 TEST METHODS:

1: FOAM HEIGHT TEST

[0075] Foam height of aqueous solution of respective hand dishwashing compositions are indicative for improved foaming properties thereby for improved cleaning capabilities.

[0076] For determination of foam height, tests with KRUSS DFA 100 equipment are performed.

[0077] Thereby, 0.4 gram of cleaning composition is mixed with 500ml of tap water of 22 FR of water hardness, whereby 1 FR is corresponding to 10mg Ca in 1 LT water. 50 ml of this mixture is taken and placed into holding cylinder of KRUSS DFA 100 device. Holding cylinder has the dimensions of 250mm height and 40mm diameter with a propeller at the bottom of the cylinder. This test mixture is stirred 120 seconds with 4000 rpm, stopped, waited 60 seconds and foam height is measured via light transmittance.

RESULTS OF FOAM HEIGHT TESTS:

[0078]

Table 1 : Foam heights are measured in mm after stopping stirring and waiting for 60 seconds.

Example 1	63mm
Example 2	44mm
Example 3	62mm
Comparative Example 1	57mm

[0079] As can be seen Example 1 which is the preferred composition of present invention, has highest foam height which is indicative for foaming strength.

[0080] Example 2 lacks of amine oxide compound which is responsible for foam enhancement therefore resulting as low foam height.

[0081] Example 3 lacks of organic solvent, apart from that very similar to Ex 1. Considering very similar foam height,

organic solvents, in this case ethanol seems not to have an impact on foam height in absence of oil.

[0082] Comparative Example 1 comprising LABSA which is a good foaming agent but its foam has big bubbles with low duration. This agent is an irritant as well which makes it less desirable.

5 [0083] Conclusively composition of present invention has high foam height compared to prior art compositions. With regard to foam height which is related to cleaning strength as well, presence of amine oxide compounds seems to be the most crucial.

## 2: FOAM HEIGHT TEST IN PRESENCE OF OIL

10 (Foam height against oil containing soil)

[0084] For determination of foam height in presence of oil tests with KRUSS DFA 100 equipment is performed.

15 [0085] Thereby, 4 grams of cleaning composition is mixed with 500ml of tap water of 22 FR of water hardness, whereby 1 FR is corresponding to 10mg Ca in 1 LT water. 40 ml of this mixture is taken and placed into holding cylinder of KRUSS DFA 100 device. 0.25 ml of IKW (Industrieverband Körperpflege und Waschmittel) Standard oil, which is consisting of margarineoil, olive oil, animal fat, butter, korn oil, sunflower oil in equal amounts, is added into this mixture (Corresponding to 3.125 ml of IKW Standard oil / 500ml tap water) .This test mixture is stirred for 120 seconds with 4000 rpm, stopped, waited for 60 seconds and foam height is measured via light transmittance.

## 20 RESULTS OF FOAM HEIGHT TESTS IN PRESENCE OF OIL:

[0086]

Table 2 : Foam heights measured in mm after stopping stirring and waiting for 60 seconds.

25	Example 1	84mm
	Example 2	55mm
	Example 3	65mm
	Comparative Example 1	46mm

30 [0087] (See Figure 2 for respective diagrams)

[0088] As can be seen Example 1 which is the preferred composition of present invention ,has greatest foam height which is indicative for foaming strength in dishwashings with oil presence.

35 [0089] Example 2 lacks of amine oxide compound which is responsible for reduced foam, therefore resulting as low foam height in dishwashings with oil presence.

[0090] Example 3 lacks of organic solvent, apart from that very similar to Ex 1 composition. Considering low foam height,organic solvents, in this case ethanol seems to have a positive impact in dishwashings with oil presence with regard to foam height consequently foam strength.

40 [0091] Comparative Example 1 comprising LABSA which is a good foaming agent but its foam has big bubbles with short duration in case of dishwashings with oil presence as well.

[0092] Conclusively compositions of present invention has elevated foam height compared to prior art compositions in dishwashings containing oil. Amine oxide has crucial share on foaming performance. Additionally organic solvent addition has a positive impact on foaming capability in presence of oily soil.

## 45 3: FOAM BREAKING POINT TEST

[0093] For determination of foam breaking point which is indicative for foam resistance, tests with KRUSS DFA 100 equipment is performed.

50 [0094] Thereby, 0.4 gram of cleaning composition is mixed with 500ml of tap water of 22 FR of water hardness, whereby 1 FR is corresponding to 10mg Ca in 1 LT water. 50 ml of this mixture is taken and placed into holding cylinder of KRUSS DFA 100 device. This test mixture is stirred 120 seconds with 4000 rpm , stopped, and waited until a drop in foam height occurs which is observable from time -foam height curve as the sustained line becomes a curve downwards.

## RESULTS OF FOAM BREAKING POINT TESTS:

55 [0095]

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**Table 3** : Measured time between stopping stirring and beginning of foam breaking.

Example 1	170 sec
Example 2	50 sec
Example 3	100 sec
Comparative Example 1	73 sec

(See FIGURE 1 for breaking point observations)

**[0096]** As can be seen Example 1 which is the preferred composition of present invention, has longest foam resistance which is indicative for foaming strength.

**[0097]** Example 2 lacks of amine oxide compound which is responsible for foam enhancement therefore resulting as short foam resistance.

**[0098]** Example 3 lacks of organic solvent apart from that very similar to Ex 1 composition. Considering moderately lower foam resistance with regard to ethanol comprising Ex 1 composition, organic solvents, in this case ethanol seems to have a positive impact with regard to foam resistance.

**[0099]** Comparative Example 1 comprising LABSA as a good foaming agent but with low duration, additionally lacking of amine oxide seems to lead to decreased foam resistance.

**[0100]** Conclusively, compositions of present invention has late foam breaking point which is indicative for foam resistance and high cleaning performance.

### 4: FOAM DURATION TEST

**[0101]** For determination of foam duration, tests with KRUSS DFA 100 equipment is performed.

**[0102]** Thereby, 0.4 gramm of cleaning composition is mixed with 500ml of tap water of 22 FR of water hardness, whereby 1 FR is corresponding to 10mg Ca in 1 LT water. 50 ml of this mixture is taken and placed into holding cylinder of KRUSS DFA 100 device. This test mixture is stirred 120 seconds with 4000 rpm, stopped, waited for 10 seconds and foam height is measured against time via light transmittance.

### RESULTS OF FOAM DURATION TESTS :

**[0103]**

**Table 4:** Measured heights at 130 sec. and 250 sec after begin of test and corresponding height decrease in %

	Foam Height after 130 sec.	Foam Height after 250 sec.	Decrease of Foam Height in Percentage
<b>Example 1:</b>	62.5mm	61.5mm	1.6%
<b>Example 2:</b>	44.2mm	25.3mm	42%
<b>Example 3:</b>	63.6mm	51.8mm	18.5%
<b>Comparative Example 1:</b>	57.8 mm	43.4 mm	24.9%

**[0104]** (See FIGURE 1 for respective diagrams)

**[0105]** Foam height decrease is calculated as

**[0106]** Foam height decrease in % :  $130 \text{ sec height} - 250 \text{ sec height} / 130 \text{ second height} \times 100$

**[0107]** 130 sec is corresponding to 120 sec stirring+ 10 sec waiting

**[0108]** 250 sec is corresponding to 120 sec waiting after 120 sec stirring +10 sec waiting

**[0109]** As can be seen Example 1, which is the preferred composition of the present invention, has the most persistent foam height. With %1.6 foam height decrease it is by far the best composition with respect of foam duration which is indicative for better cleaning performance as well.

**[0110]** Example 2 lacks of amine oxide compound which is responsible for foam enhancement therefore resulting as short foam resistance and drop of %42 height vs time.

**[0111]** Example 3 lacks of organic solvent apart from that very similar to Ex 1 composition. Considering moderate foam duration with regard to ethanol comprising Ex 1 composition, organic solvents, in this case ethanol seems to have a positive impact with regard to foam duration.

**[0112]** Comparative Example 1 comprising LABSA as a good foaming agent but with low duration, additionally lacking of amine oxide seems to lead to decreased foam duration.

**[0113]** Conclusively, compositions of present invention has better foam duration properties in comparison with prior art compositions. Especially LABSA containing prior art compositions has low foam duration. Especially in present



invention used amine oxides can be considered as essential for foam duration. Presence of organic solvent has a moderate influence for foam duration.

**[0114]** By adding oil to the above test composition after stirring, an emulsion is created which is consistent and not breaking for a long time independent type of cleaning composition. Therefore foam duration tests in presence of oil could not be applied.

## Claims

1. A liquid hand dishwashing composition with high foam duration comprising,

- a) from 3% to 30% by weight of anionic surfactant
- b) from 1% to 15% by weight of foam booster compound
- c) from 1% to 15% by weight of betaine compound
- d) water

2. A liquid hand dishwashing composition with high foam duration according to claim 1, comprising

- a) from 8% to 25% by weight of sodium lauryl ether sulfate
- b) from 3% to 10% by weight of amine oxide compound
- c) from 2% to 10 % by weight of betaine compound
- d) from 1% to 20 % by weight of organic solvent or organic solvents or mixture thereof
- e) water

3. A liquid hand dishwashing composition with high foam duration according to claim 1, comprising

- a) from 3% to 30% by weight of anionic surfactant
- b) from 1% to 15% by weight of foam booster compound
- c) from 1% to 15% by weight of betaine compound
- d) water

whereby foam duration has to be determined according to the test method as described in the specification, **characterized in that,**

foam height produced with 0.4 gram of said hand dishwashing composition mixed with 500ml of tap water decreases not more than 10% within 120 seconds after 10 seconds of stopping the stirring.

4. A liquid hand dishwashing composition with high foam duration according to claim 3, comprising

- a) from 5% to 25% by weight of sodium lauryl ether sulfate
- b) from 2% to 12% by weight of amine oxide compound
- c) from 1% to 10 % by weight of betaine compound
- d) water

whereby foam duration has to be determined according to the test method as described in the specification, **characterized in that,**

foam height produced with 0.4 gram of said hand dishwashing composition mixed with 500ml of tap water decreases not more than 10% within 120 seconds after 10 seconds of stopping the stirring.

5. A liquid hand dishwashing composition with high foam duration according to claim 2, comprising

- a) from 8% to 25% by weight of sodium lauryl ether sulfate
- b) from 3% to 10% by weight of amine oxide compound
- c) from 2% to 10 % by weight of betaine compound
- d) from 1% to 15 % by weight of organic solvent or organic solvents or mixture thereof
- e) water

whereby foam duration has to be determined according to the test method as described in the specification, **characterized in that,**

foam height produced with 0.4 gram of said hand dishwashing composition mixed with 500ml of tap water decreases not more than 10% within 120 seconds after 10 seconds of stopping the stirring.

- 5 6. A liquid hand dishwashing composition with high foam duration according to claim 5, comprising

- 10 a) from 12% to 24% by weight of sodium lauryl ether sulfate containing 1 ethoxy group  
b) from 3% to 10% by weight of cocodimethyl amine oxide  
c) from 2% to 8 % by weight of cocamidepropyl-N,N-dimethylacetic acid  
d) from 1% to 12% by weight of Ethanol  
e) water

whereby foam duration has to be determined according to the test method as described in the specification, **characterized in that,**

15 foam height produced with 0.4 gram of said hand dishwashing composition mixed with 500ml of tap water decreases not more than 10% within 120 seconds after 10 seconds of stopping the stirring.

7. A liquid hand dishwashing composition comprising

- 20 a) %20 Sodium lauryl ether sulfate containing 1 ethoxy group  
b) %7 Cocodimethyl amine oxide  
c) %4 Cocamidepropyl-N,N-dimethylacetic acid  
d) %3 Ethanol  
e) water

- 25 8. A liquid hand dishwashing composition with elevated foam height against oil containing soils comprising,

- 30 a) from 3% to 30% by weight of anionic surfactant  
b) from 1% to 15% by weight of foam booster compound  
c) from 1% to 15% by weight of betaine compound  
d) water

9. A liquid hand dishwashing composition with elevated foam height against oil containing soils according to claim 8, comprising

- 35 a) from 8% to 25% by weight of sodium lauryl ether sulfate  
b) from 3% to 10% by weight of amine oxide compound  
c) from 2% to 10% by weight of betaine compound  
d) from 1% to 20 % by weight of organic solvent or organic solvents or mixture thereof  
e) water

- 40 10. A liquid hand dishwashing composition with elevated foam height against oil containing soils according to claim 8, comprising

- 45 a) from 3% to 30% by weight of anionic surfactant  
b) from 1% to 15% by weight of foam booster compound  
c) from 1% to 15% by weight of betaine compound  
d) water

50 whereby foam height against oil containing soils has to be determined according to the test method as described in the specification,

**characterized in that,**

foam produced with 4 grams of said hand dishwashing composition mixed with 500ml of tap water and 3.125 ml of standard oil, which is containing margarineoil, olive oil, butter, korn oil, animal fat and sunflower oil in equal amounts having foam height of at least 60 mm,

55 whereby said test mixture is stirred for 120 seconds and foam height is measured after 60 seconds after stopping the stirring.

11. A liquid hand dishwashing composition with elevated foam height against oil containing soils according to claim 10,

comprising

- a) from 5% to 25% by weight of sodium lauryl ether sulfate
- b) from 2% to 12% by weight of amine oxide compound
- c) from 1% to 10 % by weight of betaine compound
- d) water

whereby foam height against oil containing soils has to be determined according to the test method as described in the specification,

**characterized in that,**

foam produced with 4 grams of said hand dishwashing composition mixed with 500ml of tap water and 3.125 ml of standard oil, which is containing margarineoil, olive oil, butter, korn oil, animal fat and sunflower oil in equal amounts having foam height of at least 60 mm,

whereby said test mixture is stirred for 120 seconds and foam height is measured after 60 seconds after stopping the stirring.

12. A liquid hand dishwashing composition with elevated foam height against oil containing soils according to claim 10, comprising

- a) from 8% to 25% by weight of sodium lauryl ether sulfate
- b) from 3% to 10% by weight of amine oxide compound
- c) from 2% to 10 % by weight of betaine compound
- d) from 1% to 15 % by weight of organic solvent or organic solvents or mixture thereof
- e) water

whereby foam height against oil containing soils has to be determined according to the test method as described in the specification,

**characterized in that,**

foam produced with 4 grams of said hand dishwashing composition mixed with 500ml of tap water and 3.125 ml of standard oil, which is containing margarineoil, olive oil, butter, korn oil, animal fat and sunflower oil in equal amounts having foam height of at least 60 mm,

whereby said test mixture is stirred for 120 seconds and foam height is measured after 60 seconds after stopping the stirring.

13. A liquid hand dishwashing composition with elevated foam height against oil containing soils according to claim 12, comprising

- a) from 12% to 24% by weight of sodium lauryl ether sulfate containing 1 ethoxy group
- b) from 3% to 10% by weight of cocodimethyl amine oxide
- c) from 2% to 8 % by weight of cocamidepropyl-N,N-dimethylacetic acid
- d) from 1% to 12% by weight of Ethanol
- e) water

whereby foam height against oil containing soils has to be determined according to the test method as described in the specification,

**characterized in that,**

foam produced with 4 grams of said hand dishwashing composition mixed with 500ml of tap water and 3.125 ml of standard oil, which is containing margarineoil, olive oil, butter, korn oil, animal fat and sunflower oil in equal amounts having foam height of at least 60 mm,

whereby said test mixture is stirred for 120 seconds and foam height is measured after 60 seconds after stopping the stirring.

14. A liquid hand dishwashing composition according to preceding claims, wherein sodium lauryl ether sulfate contain 1-6 ethoxy groups, preferably 1-3 ethoxy groups, more preferably 1 ethoxy group.

15. A liquid hand dishwashing composition according to preceding claims, wherein amine oxide compound comprises lauryl amido propyl amine oxide, myristal amido propyl amine oxide, lauryl dimethyl amine oxide, alkyl dimethyl amine oxides, cocodimethyl amine oxide, alkyl dihydroxyethyl amine oxides, cocoamidopropyl amine oxide and

cocoamide diethanolamide; preferably cocodimethylamine oxide.

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16. A liquid hand dishwashing composition according to preceding claims, wherein betaine compound comprises alkylamidepropyl-N,N-dimethyl-2-hydroxypropylsulfobetaine; alkylamidepropyl N, N-dimethylpropylsulfobetaine; lauramidepropyl-N,N-dimethylacetic acid betaine; myristamidepropyl-N, N-dimethylacetic acid betaine; alkylhydroxy sulfobetaine; alkylamideamine-type betaine; alkylimidazoline-type betaine; cocamidepropyl-N,N-dimethylacetic acid betaine; cocamidepropyl-N,N-dimethylacetic acid; preferably cocamide propyl-N,N-dimethylacetic acid.
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17. A liquid hand dishwashing composition according to preceding claims, wherein organic solvents used are alcohol, polyalcohol, keton, ether, polyether or mixtures thereof
18. A liquid hand dishwashing composition according to claim 17, wherein preferred organic solvents are ethanol, isopropanol, ethyleneglycol and glycerin, more preferably ethanol.
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19. A liquid hand dishwashing composition according to preceding claims, wherein the composition further comprises complexation agent, antibacterial agent, salt, buffering agent, builder and fragrance.
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20. A liquid hand dishwashing composition according to claim 19, wherein complexation agent comprises polycarboxylated organic acids, citric acid and its salts, polyphosphate, polyacrylate, EDTA and its salts, preferably EDTA and its salts.
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21. A liquid hand dishwashing composition according to claim 19, wherein antibacterial agent comprises benzalkonium chloride, ethyl paraben, methyl paraben, propyl paraben, benzethonium chloride a thiazol compound or mixtures thereof, methylisothiazolinone, 5-Chloro-2-Methyl-2H-isothiazol-3-one and 2-Methyl-2H-isothiazol-3-one, preferably antibacterial agent is a mixture of 5-Chloro-2-Methyl-2H-isothiazol-3-one and 2-Methyl-2H-isothiazol-3-one.
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22. Use of liquid hand dishwashing compositions according to preceding claims for removing stains preferably stains with oil.

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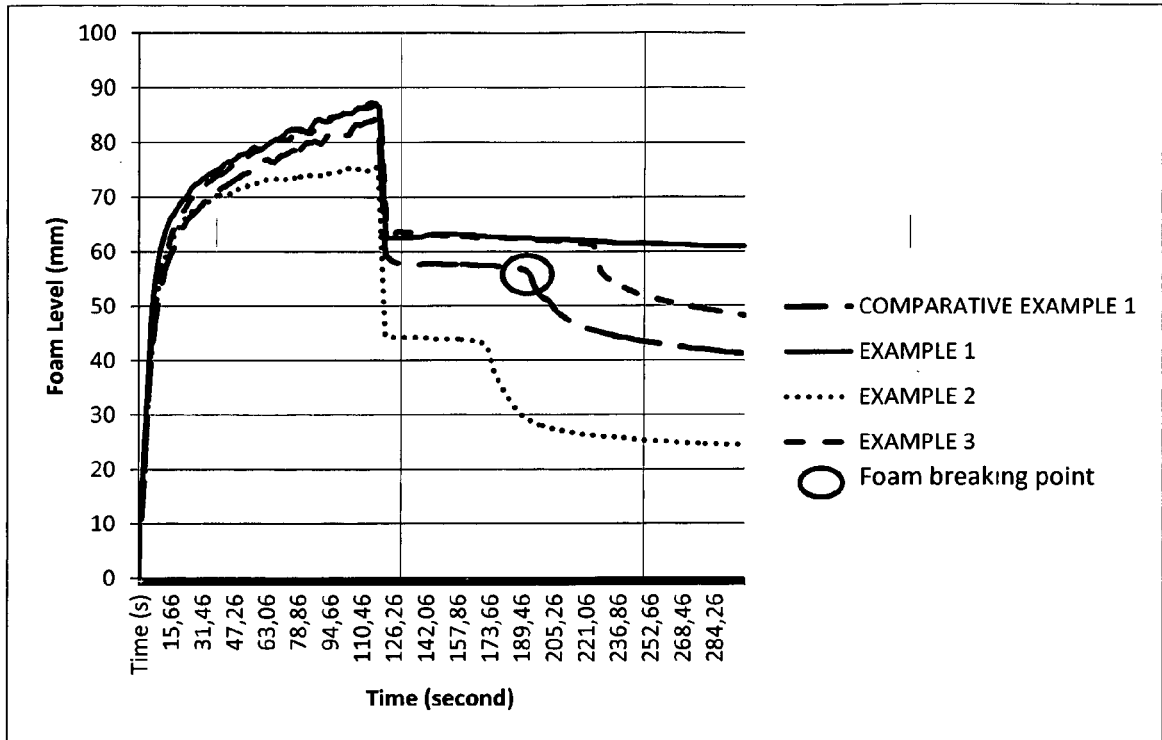


FIGURE 1

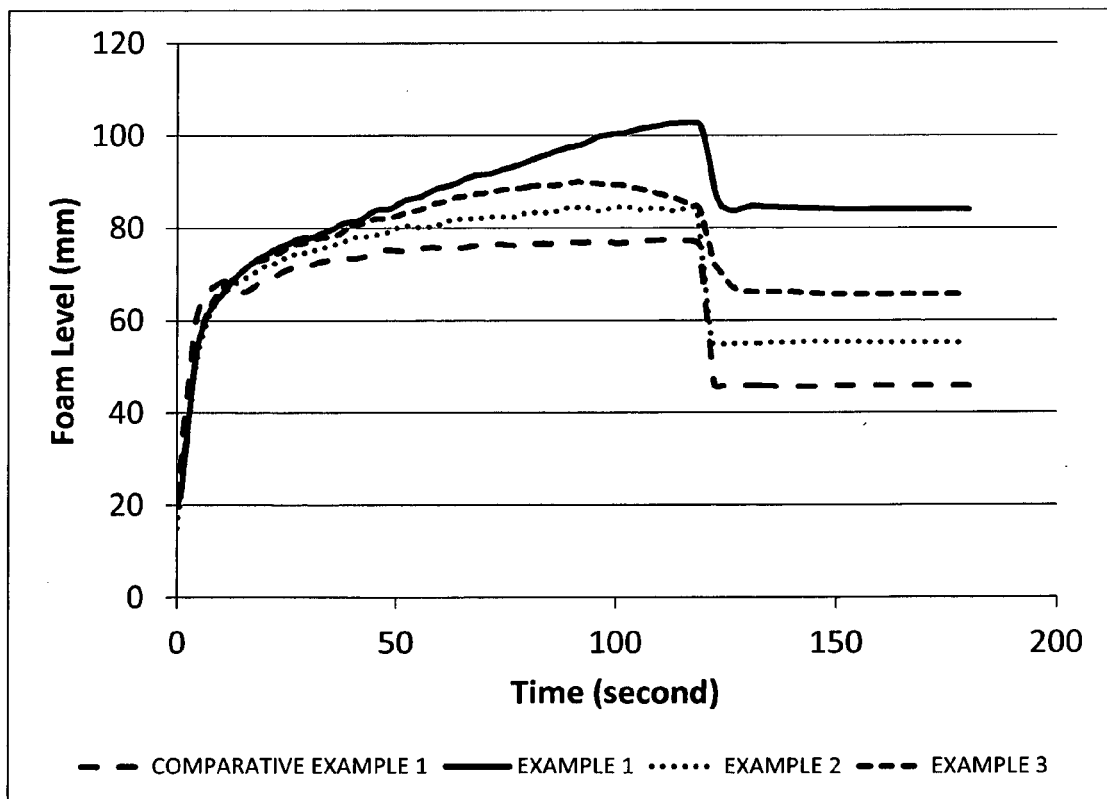


FIGURE 2



EUROPEAN SEARCH REPORT

Application Number  
EP 14 00 2454

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 420 558 A1 (PROCTER & GAMBLE [US]) 22 February 2012 (2012-02-22) * example 8 *	1-16	INV. C11D1/94 C11D3/00
X	US 2004/005991 A1 (BOUCHER JEFFREY EDWARD [CN] ET AL) 8 January 2004 (2004-01-08) * example 1:VI *	1-16	
X	US 2004/029757 A1 (LEVITT MARK D [US] ET AL) 12 February 2004 (2004-02-12) * paragraph [0068] - paragraph [0069]; example 1 *	1-16	
X,D	US 5 990 065 A (VINSON PHILLIP KYLE [US] ET AL) 23 November 1999 (1999-11-23) * examples 1A,3B,3H,3I *	1-16	
A	DE 10 2009 005791 A1 (HENKEL AG & CO KGAA [DE]) 29 July 2010 (2010-07-29) * table 1 *	1-16	
			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
The Hague		14 April 2015	Richards, Michael
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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<b>CLAIMS INCURRING FEES</b>	
The present European patent application comprised at the time of filing claims for which payment was due.	
<input checked="" type="checkbox"/>	Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):  16
<input type="checkbox"/>	No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.
<b>LACK OF UNITY OF INVENTION</b>	
The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:	
<input type="checkbox"/>	All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
<input type="checkbox"/>	As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
<input type="checkbox"/>	Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
<input type="checkbox"/>	None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:
<input type="checkbox"/>	The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 14 00 2454

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2420558 A1	22-02-2012	AR 082717 A1	26-12-2012
		CA 2806329 A1	23-02-2012
		EP 2420558 A1	22-02-2012
		JP 2013537580 A	03-10-2013
		RU 2013101986 A	27-09-2014
		US 2012046214 A1	23-02-2012
		WO 2012024076 A1	23-02-2012
-----			
US 2004005991 A1	08-01-2004	NONE	
-----			
US 2004029757 A1	12-02-2004	NONE	
-----			
US 5990065 A	23-11-1999	CN 101538513 A	23-09-2009
		US 5990065 A	23-11-1999
		ZA 9711423 A	24-06-1998
-----			
DE 102009005791 A1	29-07-2010	DE 102009005791 A1	29-07-2010
		WO 2010084057 A1	29-07-2010
-----			



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- CA 2237694 [0013]
- US 5990065 A [0013]
- WO 9404640 A [0014]