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(54) Title: OIL-IN-WATER EMULSION COMPOSITION COMPRISING ETHER OIL

(57) Abstract: The present invention relates to a composition in the form of an oil-in-water emulsion, comprising: (a) at least one ether oil; (b) at least one nonionic surfactant; (c) at least one anionic surfactant; (d) at least one betaine; and (e) water. The composition according to the present invention can have a good stability.

DESCRIPTION

OIL-IN-WATER EMULSION COMPOSITION COMPRISING ETHER OIL

TECHNICAL FIELD

The present invention relates to a compositon in the form of an oil-in-water emulsion, preferably a cosmetic composition, and more preferably a cleansing composition.

BACKGROUND ART

Cleansing the skin is very important when caring for the face. The cleansing must be as effective as possible because greasy residues, such as excess sebum, the remnants of cosmetic products used daily, and make-up products, in particular waterproof products, tend to accumulate in skin folds, and block the pores of the skin resulting in the appearance of spots.

Several types of skin cleansing products, for example, rinsable cleansing anhydrous oils and gels, and foaming creams, lotions and gels, are known. For example, JP-A-2014-122198 discloses a rinse-off cosmetic composition in the form of a nano- or microemulsion, comprising (a) at least one oil; (b) at least one non ionic surfactant with HLB 7-14; (c) at least one associative polyurethane; (d) at least one polyol; and (e) water, wherein the amount of the (a) oil ranges from at least 20% by weight relative to the total weight of the composition. In addition, US-B-6,468,551 discloses oil-in-water microemulsion gels, (a) which comprise a discontinuous oil phase and a continuous aqueous phase, one or more oil-in-water emulsifiers which do not contain ethylene oxide or propylene oxide and optionally furthermore comprising one or more water-in-oil emulsifiers having an emulsifier content of less than 20% by weight, based on the total weight of the microemulsion, and which is formed by formulating a mixture of the base components, comprising the aqueous phase, the oil phase, one or more of said oil-in-water emulsifiers, optionally one or more water-in-oil emulsifiers, and optionally further auxiliaries, additives and/or active compounds, to form a microemulsion, and (b) in which the droplets of the discontinuous oil phase are joined to one another by one or more crosslinking substances, the molecules of which have at least one hydrophilic region, which has an extension sufficient to bridge the distance between the microemulsion droplets, and at least one hydrophobic region, which enters into a hydrophobic interaction with the microemulsion droplets.

Rinsable anhydrous oils and gels have a cleansing action mainly by virtue of oils present in these formulations. These oils make it possible to dissolve fatty residues and disperse make-up pigments. These products are effective and well tolerated. However, they exhibit the disadvantages of being heavy, of not foaming, and of not conferring a feeling of freshness on application, all of which are disadvantageous from a cosmetic viewpoint.

On the other hand, foaming creams, lotions and gels without oils have a cleansing action mainly by virtue of the surfactants therein, which suspend the fatty residues and the pigments of, for example, the make-up products. They are effective and pleasant to use because they foam and are easy to remove.

Microemulsions (oil in water, water in oil or bicontinuous) have been developed in recent years as an alternative to cleansing oils and are very much appreciated for their excellent efficacy on foundation and waterproof mascara. The advantage of microemulsions is to present sometimes better rinsibility for usually the same make-up removal efficacy. However, it is in general

difficult to maintain the form of nano- or microemulsions over time.

Therefore, there is still a need to provide a stable nano- or microemulsion composition, in particular for a cleansing composition, which can maintain a microemulsion state over time.

DISCLOSURE OF INVENTION

An objective of the present invention is to provide a stable oil-in-water nano- or microemulsion composition which has good stability in terms of the maintainance of the microemulsion state.

The above objective of the present invention can be achieved by a composition in the form of an oil-in-water emulsion, comprising:

(a) at least one ether oil;
(b) at least one nonionic surfactant;
(c) at least one anionic surfactant;
(d) at least one betaine; and
(e) water.

An oil droplet in the composition may have a volume-average particle size of less than 100 nm, preferably less than 90 nm, and more preferably less than 80 nm.

The (a) ether oil may be selected from the group consisting of dicaprylyl ether, dicapryl ether, dilauryl ether, diisostearyl ether, dioctyl ether, nonyl phenyl ether, dodecyl dimethylbutyl ether, cetyl dimethylbutyl ether, cetyl isobutyl ether, and mixtures thereof.

The amount of the (a) ether oil(s) in the composition may range from 0.1 to 40% by weight, preferably from 1 to 30% by weight, and more preferably from 3 to 20% by weight, relative to the total weight of the composition.

The (b) nonionic surfactant may be chosen from:

(1) surfactants chosen from polyglyceryl fatty acid esters, polyoxyalkylenated alkyl glycerides, and polyoxyalkylenated fatty ethers;
(2) mixed esters of fatty acids or of fatty alcohols, of carboxylic acid and of glycerol;
(3) fatty acid esters of sugars and fatty alcohol ethers of sugars;
(4) surfactants chosen from fatty esters of sorbitan and oxyalkylenated fatty esters of sorbitan, and oxyalkylenated fatty esters;
(5) block copolymers of ethylene oxide (A) and of propylene oxide (B),
(6) polyoxyethylenated (1-40 EO) and polyoxypropylenated (1-30 PO) alkyl (C_{16}-C_{30}) ethers,
(7) silicone surfactants, and
(8) mixtures thereof.

The (b) nonionic surfactant may be chosen from:

- polyglyceryl fatty acid esters of at least one, preferably one, fatty acid comprising at least one saturated or unsaturated, linear or branched C_8-C_{22} hydrocarbon group such as C_8-C_{22} alkyl or alkenyl group, preferably C_8-C_{18} alkyl or alkenyl group, and more preferably C_8-C_{12} alkyl or alkenyl group, and of 2 to 12 glycerols, preferably 2 to 10 glycerols and more preferably 2 to 8 glycerols;
- polyoxyethylenated alkyl glycerides such as polyethylene glycol derivatives of a mixture of mono-, di- and tri-glycerides of caprylic and capric acids (preferably 2 to 30 ethylene

oxide units, more preferably 2 to 20 ethylene oxide units, and even more preferably 2 to 10 ethylene oxide units);

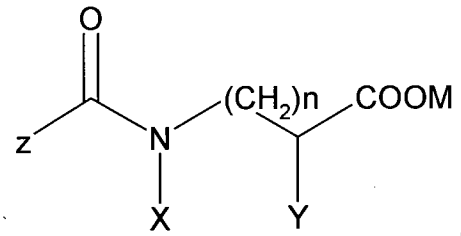
- polyoxyethylenated fatty ethers of at least one, preferably one, fatty alcohol comprising at least one saturated or unsaturated, linear or branched C_8-C_{22} hydrocarbon group such as C_8-C_{22} alkyl or alkenyl group, preferably C_8-C_{18} alkyl or alkenyl group, and more preferably C_8-C_{12} alkyl or alkenyl group, and of 2 to 60 ethylene oxides, preferably from 2 to 30 ethylene oxides, and more preferably from 2 to 10 ethylene oxides; and
- mixtures thereof.

The (b) nonionic surfactant may comprise at least one polyglyceryl fatty acid monoester and at least one polyglyceryl fatty acid diester.

The amount of the (b) nonionic surfactant(s) in the composition may range from 0.1 to 30% by weight, preferably from 1 to 20% by weight, and more preferably from 3 to 16% by weight relative to the total weight of the composition.

The (c) anionic surfactant may be chosen from amino acid based anionic surfactants.

The (c) anionic surfactant may be represented by the formula (IV):



(IV)

wherein:
Z represents a saturated or unsaturated, linear or branched hydrocarbon group having 8 to 22 carbon atoms,
X is hydrogen or a methyl group,
n is 0 or 1,
Y is selected from hydrogen, $-CH_3$, $-CH(CH_3)_2$, $-CH_2CH(CH_3)_2$, $-CH(CH_3)CH_2CH_3$, $-CH_2C_6H_5$, $-CH_2C_2H_4OH$, $-CH_2OH$, $-CH(OH)CH_3$, $-(CH_2)_4NH_2$, $-(CH_2)_3NHC(NH)NH_2$, $-CH_2C(O)O^-M^+$, $-(CH_2)_2C(O)OH$, $-(CH_2)_2C(O)O^-M^+$, and
M is a salt-forming cation wherein COO is the counter-anion, such as for example sodium, potassium, ammonium, or triethanolamine.

The amount of the (c) anionic surfactant(s) in the composition may range from 0.01 to 10% by weight, preferably from 0.05 to 5% by weight, and more preferably from 0.1 to 1% by weight, relative to the total weight of the composition.

The (d) betaine may be chosen from trimethyl glycine, carnitine, and L-proline betaine or stachydrine

The amount of the (d) betaine(s) in the composition ranges from 0.01 to 15% by weight, preferably from 0.1 to 10% by weight, and more preferably from 0.3 to 5% by weight, relative to the total weight of the composition.

The amount of the (e) water in the composition ranges from 30 to 90% by weight, preferably from 40 to 80% by weight, and more preferably from 50 to 70% by weight, relative to the total weight of the composition.

The composition according to the present invention may be used as is or may be used for a cleansing product, preferably a make-up cleansing product for skin, and more preferably a make-up cleansing product for the body and/or the face.

The present invention also relates to a process for cleansing a keratin substance such as skin, hair, mucous membranes, nails, eyelashes, eyebrows, and the scalp, comprising the step of applying the composition according to the present invention to the keratin substance.

BEST MODE FOR CARRYING OUT THE INVENTION

After diligent research, the inventors have discovered that it is possible to provide an oil-in-water nano- or microemulsion composition which can have good stability over time by combining (a) at least one ether oil, (b) at least one nonionic surfactant, (c) at least one anionic surfactant, (d) at least one betaine, and (e) water.

Thus, the composition according to the present invention is a composition in the form of an oil-in-water emulsion, comprising:

(a) at least one ether oil;
(b) at least one nonionic surfactant;
(c) at least one anionic surfactant;
(d) at least one betaine; and
(e) water.

The composition according to the present invention exhibits good stability in terms of the maintainance of the nano- or microemulsion state even though it is left to stand for at least two months.

Since the composition according to the present invention includes (a) ether oil(s), (b) nonionic surfactant(s), as well as (c) anionic surfactant(s), it can be said that the composition according to the present invention has a cleansing ability.

In addition, since the the composition according to the present invention is in the form of a nano- or microemulsion, the composition can show a good appearance which is transparent or slightly translucent (not opaque), which is preferred by consumers.

Also, as the composition according to the present invention includes a substantial amount of water, which forms the outer phase of the composition in the form of an oil-in-water emulsion, the composition according to the present invention can provide a good feeling on the skin after use, such as a refreshing, smoothing and moisturizing sensation.

Hereinafter, the composition, process and use, according to the present invention will be explained in a more detailed manner.

[Composition]

The composition according to the present invention may be in the form of a nano- or

microemulsion.

The "microemulsion" may be defined in two ways, namely, in a broader sense and in a narrower sense. That is to say, there is one case ("microemulsion in the narrow sense") in which the microemulsion refers to a thermodynamically stable isotropic single liquid phase containing a ternary system having the three ingredients of an oily component, an aqueous component and a surfactant, and another case ("microemulsion in the broad sense") in which among thermodynamically unstable typical emulsion systems, the microemulsion additionally includes those such emulsions presenting transparent or translucent appearances due to their smaller particle sizes (Satoshi Tomomasa, et al., Oil Chemistry, Vol. 37, No. 11 (1988), pp. 48-53).

The microemulsion refers to any of an O/W (oil-in-water) type microemulsion in which oil is solubilized by micelles, a W/O (water-in-oil) type microemulsion in which water is solubilized by reverse micelles, or a bicontinuous microemulsion in which the number of associations of surfactant molecules is rendered infinite so that both the aqueous phase and oil phase have a continuous structure.

The "nanoemulsion" here means an emulsion characterized by a dispersed phase with a size of less than 100 nm, the dispersed phase being stabilized by a crown of the (b) nonionic surfactant, the (c) anionic surfactants, and the like that may optionally form a liquid crystal phase of lamellar type, at the dispersed phase/continuous phase interface. In the absence of specific opacifiers, the transparency of the nanoemulsions arises from the small size of the dispersed phase, this small size possibly being obtained by virtue of the use of mechanical energy and especially a high-pressure homogenizer.

Nanoemulsions can be distinguished from microemulsions by their structure. Specifically, microemulsions are thermodynamically stable dispersions formed from, for example, micelles which are formed by the (b) nonionic surfactant, the (c) anionic surfactants, and the like, and are swollen with the (a) ether oil. Furthermore, microemulsions do not require substantial mechanical energy in order to be prepared.

The composition according to the present invention is in the form of an O/W nano- or microemulsion.

It is preferable that the composition according to the present invention be in the form of an O/W nano- or microemulsion wherein the oil phase in the form of an oil droplet has a volume-average particle size of 100 nm or less, preferably less than 90 nm, and more preferably less than 80 nm, for example, from 10 to 95 nm, preferably from 10 to 85 nm and more preferably from 10 to 75 nm. The volume average particle diameter of the oil dloplet can be measured, for example, with ELSZ-2000 zeta-potential & particle size analyzer from Otsuka Electronics.

The composition according to the present invention can have a transparent or slightly translucent appearance, preferably a transparent appearance. The transparent appearance of the composition according to the present invention may have a slight blue color.

The measurement of the appearance may be taken on the undiluted composition. The blank is determined with distilled water. The transparency may be measured by measuring the nephelometric turbidity (for example, with 2100Q Portable Turbidimeter from HACH).

The composition according to the present invention may preferably have a nephelometric turbidity

lower than 150 NTU, preferably lower than 100 NTU, and more preferably lower than 50 NTU.

The viscosity of the composition according to the present invention is not particularly limited, as long as the composition according to the present invention is fluidable while it does not drip off from the keratin substance. The viscosity can be measured at 25°C with viscosimeters or rheometers preferably with cone-plane geometry. Preferably, the viscosity of the composition according to the present invention can range, for example, from 1 to 3000 Pa.s, and preferably from 1 to 2000 Pa.s at 25°C and 1 s^{-1}.

The form of the composition according to the present invention is not particularly limited, as long as it is in the form of an oil-in-water emulsion, such as an aqueous gel, an aqueous solution, or the like.

The composition according to the present invention comprises (a) at least one ether oil, (b) at least one nonionic surfactant, (c) at least one anionic surfactant, (d) at least one betaine, and (e) water. The ingredients in the composition will be described in a detailed manner below.

(Ether Oil)

The composition according to the present invention comprises (a) at least one ether oil. A single type of ether oil may be used, but two or more different types of ether oils may be used in combination.

Here, "oil" means a fatty compound or substance that is in the form of a liquid or a paste (non-solid) at room temperature (25°C) and under atmospheric pressure (760 mmHg).

The (a) ether oil may be volatile or non-volatile, preferably non-volatile.

It may be preferable to use, as the (a) ether oil, dialkyl ethers such as those represented by the following formula:

$$R^1\text{-}O\text{-}R^2$$

wherein
each of R^1 and R^2 independently denotes a linear, branched or cyclic C_4-C_{24} alkyl group, preferably C_6-C_{18} alkyl group, and more preferably C_8-C_{12} alkyl group. It may be preferable that R^1 and R^2 are the same.

As the linear alkyl group, mention may be made of a butyl group, a pentyl group, a hexyl group, a heptyl group, an octyl group, a nonyl group, a decyl group, an undecyl group, a dodecyl group, a tridecyl group, a tetradecyl group, a pentadecyl group, a hexadecyl group, a heptadecyl group, an octadecyl group, a nonadecyl group, an eicosyl group, a behenyl group, a docosyl group, a tricosyl group, and a tetracosyl group.

As the branched alkyl group, mention may be made of a 1-methylpropyl group, a 2-methylpropyl group, a t-butyl group, a 1,1-dimethylpropyl group, a 3-methylhexyl group, a 5-methylhexyl group, a 1-ethylhexyl group, a 2-ethylhexylgroup, a 1-butylpentyl group, a 5-methyloctyl group, a 1-ethylhexyl group, a 2-ethylhexyl group, a 1-butylpentyl group, a 5-methyloctyl group, a 2-butyloctyl group, an isotridecyl group, a 2-pentylnonyl group, a 2-hexyldecyl group, an isostearyl group, a 2-heptylundecyl group, a 2-octyldodecyl group, a 1,3-dimethylbutyl group, a

1-(1-methylethyl)-2-methylpropyl group, a 1,1,3,3-tetramethylbutyl group, a 3,5,5-trimethylhexyl group, a 1-(2-methylpropyl)-3-methylbutyl group, a 3,7-dimethyloctyyl group, and a 2-(1,3,3-trimethylbutyl)-5,7,7-trimethyloctyl group.

As the cyclic alkyl group, mention may be made of a cyclohexyl group, a 3-methylcyclohexyl group, and a 3,3,5-trimethylcyclohexyl group.

It may be preferable that the (a) ether oil be selected from the group consisting of dicaprylyl ether, dicapryl ether, dilauryl ether, diisostearyl ether, dioctyl ether, nonyl phenyl ether, dodecyl dimethylbutyl ether, cetyl dimethylbutyl ether, cetyl isobutyl ether, and mixtures thereof.

It may be more preferable that the (a) ether oil be selected from the group consisting of dicaprylyl ether, dicapryl ether, dilauryl ether, diisostearyl ether, dioctyl ether, and mixtures thereof.

The amount of the (a) ether oil(s) in the composition according to the present invention may be 0.1% by weight or more, preferably 1% by weight or more, and more preferably 3% by weight or more relative to the total weight of the composition. It may be even more preferable that the amount of the (a) ether oil(s) in the composition according to the present invention be 5% by weight or more relative to the total weight of the composition.

On the other hand, the amount of the (a) ether oil(s) in the composition according to the present invention may be 40% by weight or less, preferably 30% by weight or less, and more preferably 20% by weight or less relative to the total weight of the composition. It may be even more preferable that the amount of the (a) ether oil(s) in the composition according to the present invention be 15% by weight or less relative to the total weight of the composition.

The amount of the (a) ether oil(s) in the composition according to the present invention may range from 0.1 to 40% by weight, preferably from 1 to 30% by weight, and more preferably from 3 to 20% by weight relative to the total weight of the composition. It may be even more preferable that the amount of the (a) ether oil(s) in the composition according to the present invention be from 5% to 15% by weight relative to the total weight of the composition.

(Nonionic Surfactant)

The composition according to the present invention comprises (b) at least one nonionic surfactant. A single type of specific nonionic surfactant may be used, but two or more different types of specific nonionic surfactants may be used in combination.

The nonionic surfactant may have an HLB (Hydrophilic Lipophilic Balance) value of from 8.0 to 14.0, preferably from 9.0 to 13.5, and more preferably from 10.0 to 13.0. If two or more nonionic surfactants are used, the HLB value is determined by the weight average of the HLB values of all the nonionic surfactants.

The (b) nonionic surfactant may be chosen from:

(1) surfactants chosen from polyglyceryl fatty acid esters, polyoxyalkylenated alkyl glycerides, and polyoxyalkylenated fatty ethers;
(2) mixed esters of fatty acid or of fatty alcohol, of carboxylic acid and of glycerol;
(3) fatty acid esters of sugars and fatty alcohol ethers of sugars;
(4) surfactants chosen from fatty esters of sorbitan and oxyalkylenated fatty esters of sorbitan, and oxyalkylenated fatty esters;

(5) block copolymers of ethylene oxide (A) and of propylene oxide (B),
(6) polyoxyethylenated (1-40 EO) and polyoxypropylenated (1-30 PO) alkyl (C_{16}-C_{30}) ethers,
(7) silicone surfactants, and
(8) mixtures thereof.

The surfactant (1) may be a fluid at a temperature of less than or equal to 45°C.

The surfactant (1) may be in particular:

- polyglyceryl fatty acid esters of at least one, preferably one, fatty acid comprising at least one saturated or unsaturated, linear or branched C_8-C_{22} hydrocarbon group such as a C_8-C_{22} alkyl or alkenyl group, preferably a C_8-C_{18} alkyl or alkenyl group, and more preferably a C_8-C_{12} alkyl or alkenyl group, and of 2-12 glycerols, preferably 2-10 glycerols and more preferably 2-8 glycerols;
- polyoxyethylenated (PEGylated) alkyl glycerides such as polyethylene glycol derivatives of a mixture of mono-, di- and tri-glycerides of caprylic and capric acids (preferably 2 to 30 ethylene oxide units, more preferably 2 to 20 ethylene oxide units, and even more preferably 2 to 10 ethylene oxide units), e.g., PEG-6 Caprylic/Capric Glycerides, PEG-7 Caprylic/Capric Glycerides, and PEG-7 glyceryl cocoate;
- polyoxyethylenated fatty ethers of at least one, preferably one, fatty alcohol comprising at least one saturated or unsaturated, linear or branched C_8-C_{22} hydrocarbon group such as a C_8-C_{22} alkyl or alkenyl group, preferably a C_8-C_{18} alkyl or alkenyl group, and more preferably a C_8-C_{12} alkyl or alkenyl group, and of 2 to 60 ethylene oxides, preferably from 2 to 30 ethylene oxides, and more preferably 2 to 10 ethylene oxides; and
- mixtures thereof.

It is preferable that the (b) nonionic surfactant be a mixture of at least two selected from the above polyglyceryl fatty acid esters, polyoxyethylenated alkyl glycerides, and polyoxyethylenated fatty ethers.

It is preferable that the polyglyceryl fatty acid ester have a polyglycerol moiety derived from 2 to 10 glycerols, more preferably from 2 to 8 glycerols, and further more preferably 5 to 7 glycerols.

The polyglyceryl fatty acid ester may be chosen from the mono, di and tri esters of saturated or unsaturated acid, preferably saturated fatty acid, including 8 to 22 carbon atoms, preferably 8 to 18 carbon atoms, and more preferably 8 to 12 carbon atoms, such as caprylic acid, capric acid, lauric acid, oleic acid, stearic acid, isostearic acid, and myristic acid.

It is preferable that the (b) nonionic surfactant comprise at least one polyglyceryl fatty acid monoester and at least one polyglyceryl fatty acid diester.

The polyglyceryl fatty acid ester may be selected from the group consisting of PG2 caprate, PG2 dicaprate, PG2 tricaprate, PG2 caprylate, PG2 dicaprylate, PG2 tricaprylate, PG2 laurate, PG2 dilaurate, PG2 trilaurate, PG2 myristate, PG2 dimyristate, PG2 trimyristate, PG2 stearate, PG2 distearate, PG2 tristearate, PG2 isostearate, PG2 diisostearate, PG2 triisostearate, PG2 oleate, PG2 dioleate, PG2 trioleate, PG2 lactylate, PG2 dilactylate, PG2 trilactylate, PG3 caprate, PG3 dicaprate, PG3 tricaprate, PG3 caprylate, PG3 dicaprylate, PG3 tricaprylate, PG3 laurate, PG3 dilaurate, PG3 trilaurate, PG3 myristate, PG3 dimyristate, PG3 trimyristate, PG3 stearate, PG3 distearate, PG3 tristearate, PG3 isostearate, PG3 diisostearate, PG3 triisostearate, PG3 oleate, PG3 dioleate, PG3 trioleate, PG3 lactylate, PG3 dilactylate, PG3 trilactylate, PG4 caprate, PG4

dicaprate, PG4 tricaprate, PG4 caprylate, PG4 dicaprylate, PG4 tricaprylate, PG4 laurate, PG4 dilaurate, PG4 trilaurate, PG4 myristate, PG4 dimyristate, PG4 trimyristate, PG4 stearate, PG4 distearate, PG4 tristearate, PG4 isostearate, PG4 diisostearate, PG4 triisostearate, PG4 oleate, PG4 dioleate, PG4 trioleate, PG4 lactylate, PG4 dilactylate, PG4 trilactylate, PG5 caprate, PG5 dicaprate, PG5 tricaprate, PG5 caprylate, PG5 dicaprylate, PG5 tricaprylate, PG5 laurate, PG5 dilaurate, PG5 trilaurate, PG5 myristate, PG5 dimyristate, PG5 trimyristate, PG5 stearate, PG5 distearate, PG5 tristearate, PG5 isostearate, PG5 diisostearate, PG5 triisostearate, PG5 oleate, PG5 dioleate, PG5 trioleate, PG5 lactylate, PG5 dilactylate, PG5 trilactylate, PG6 caprate, PG6 dicaprate, PG6 tricaprate, PG6 caprylate, PG6 dicaprylate, PG6 tricaprylate, PG6 laurate, PG6 dilaurate, PG6 trilaurate, PG6 myristate, PG6 dimyristate, PG6 trimyristate, PG6 stearate, PG6 distearate, PG6 tristearate, PG6 isostearate, PG6 diisostearate, PG6 triisostearate, PG6 oleate, PG6 dioleate, PG6 trioleate, PG6 lactylate, PG6 dilactylate, PG6 trilactylate, PG10 caprate, PG10 dicaprate, PG10 tricaprate, PG10 caprylate, PG10 dicaprylate, PG10 tricaprylate, PG10 laurate, PG10 dilaurate, PG10 trilaurate, PG10 myristate, PG10 dimyristate, PG10 trimyristate, PG10 stearate, PG10 distearate, PG10 tristearate, PG10 isostearate, PG10 diisostearate, PG10 triisostearate, PG10 oleate, PG10 dioleate, PG10 trioleate, PG10 lactylate, PG10 dilactylate, and PG10 trilactylate,.

The polyoxyalkylenated fatty ethers, preferably polyoxyethylenated fatty ethers, may comprise from 2 to 60 ethylene oxide units, preferably from 2 to 30 ethylene oxide units, and more preferably from 2 to 10 ethylene oxide units. The fatty chain of the ethers may be chosen in particular from lauryl, behenyl, arachidyl, stearyl and cetyl units, and mixtures thereof, such as cetearyl. Examples of ethoxylated fatty ethers which may be mentioned are lauryl alcohol ethers comprising 2, 3, 4, and 5 ethylene oxide units (CTFA names: Laureth-2, Laureth-3, Laureth-4, and Laureth-5), such as the products sold under the names Nikkol BL-2 by the company Nikko Chemicals, Emalex 703 by the company Nihon Emulsion Co., Ltd, Nikkol BL-4 by the company Nikko Chemicals, and EMALEX 705 by the company Nihon Emulsion Co., Ltd.

The (2) mixed esters of fatty acids, or of fatty alcohols, of carboxylic acid and of glycerol, which can be used as the above nonionic surfactant, may be chosen in particular from the group comprising mixed esters of fatty acids or of fatty alcohols with an alkyl or alkenyl chain containing from 8 to 22 carbon atoms, preferably from 8 to 18 carbon atoms, and more preferably from 8 to 12 carbon atoms, and of α-hydroxy acid and/or of succinic acid, with glycerol. The α-hydroxy acid may be, for example, citric acid, lactic acid, glycolic acid or malic acid, and mixtures thereof.

The alkyl chain of the fatty acids or alcohols from which are derived the mixed esters which can be used in the nanoemulsion of the present invention may be linear or branched, and saturated or unsaturated. They may especially be stearate, isostearate, linoleate, oleate, behenate, arachidonate, palmitate, myristate, laurate, caprate, isostearyl, stearyl, linoleyl, oleyl, behenyl, myristyl, lauryl or capryl chains, and mixtures thereof.

As examples of mixed esters which can be used in the nanoemulsion of the present invention, mention may be made of the mixed ester of glycerol and of the mixture of citric acid, lactic acid, linoleic acid and oleic acid (CTFA name: Glyceryl citrate/lactate/linoleate/oleate) sold by the company Hüls under the name Imwitor 375; the mixed ester of succinic acid and of isostearyl alcohol with glycerol (CTFA name: Isostearyl diglyceryl succinate) sold by the company Hüls under the name Imwitor 780 K; the mixed ester of citric acid and of stearic acid with glycerol (CTFA name: Glyceryl stearate citrate) sold by the company Hüls under the name Imwitor 370; the mixed ester of lactic acid and of stearic acid with glycerol (CTFA name: Glyceryl stearate

lactate) sold by the company Danisco under the name Lactodan B30 or Rylo LA30.

The (3) fatty acid esters of sugars, which can be used as the above nonionic surfactant, may be chosen in particular from the group comprising esters or mixtures of esters of C_8-C_{22} fatty acids and of sucrose, of maltose, of glucose or of fructose, and esters or mixtures of esters of C_{14}-C_{22} fatty acids and of methylglucose.

The C_8-C_{22} or C_{14}-C_{22} fatty acids forming the fatty unit of the esters which can be used in the present invention comprise a saturated or unsaturated linear alkyl or alkenyl chain containing, respectively, from 8 to 22 or from 14 to 22 carbon atoms. The fatty unit of the esters may be chosen in particular from stearates, behenates, arachidonates, palmitates, myristates, laurates and caprates, and mixtures thereof. Stearates are preferably used.

As examples of esters or mixtures of esters of fatty acids and of sucrose, of maltose, of glucose or of fructose, mention may be made of sucrose monostearate, sucrose distearate and sucrose tristearate and mixtures thereof, such as the products sold by the company Croda under the name Crodesta F50, F70, F110 and F160; and examples of esters or mixtures of esters of fatty acid and of methylglucose which may be mentioned are methylglucose polyglyceryl-3 distearate, sold by the company Goldschmidt under the name Tego-care 450. Mention may also be made of glucose or maltose monoesters such as methyl o-hexadecanoyl-6-D-glucoside and o-hexadecanoyl-6-D-maltoside.

The (3) fatty alcohol ethers of sugars, which can be used as the above nonionic surfactant, may be solid at a temperature of less than or equal to 45°C and may be chosen in particular from the group comprising ethers or mixtures of ethers of C_8-C_{22} fatty alcohols and of glucose, of maltose, of sucrose or of fructose, and ethers or mixtures of ethers of C_{14}-C_{22} fatty alcohol and of methylglucose. These are in particular alkylpolyglucosides.

The C_8-C_{22} or C_{14}-C_{22} fatty alcohols forming the fatty unit of the ethers which may be used in the nanoemulsion of the present invention comprise a saturated or unsaturated, linear alkyl or alkenyl chain containing, respectively, from 8 to 22 or from 14 to 22 carbon atoms. The fatty unit of the ethers may be chosen in particular from decyl, cetyl, behenyl, arachidyl, stearyl, palmityl, myristyl, lauryl, capryl and hexadecanoyl units, and mixtures thereof, such as cetearyl.

As examples of fatty alcohol ethers of sugars, mention may be made of alkylpolyglucosides such as decylglucoside and laurylglucoside, which are sold, for example, by the company Henkel under the respective names Plantaren 2000 and Plantaren 1200, cetostearyl glucoside optionally as a mixture with cetostearyl alcohol, sold for example, under the name Montanov 68 by the company SEPPIC, under the name Tego-care CG90 by the company Goldschmidt and under the name Emulgade KE3302 by the company Henkel, as well as arachidyl glucoside, for example in the form of a mixture of arachidyl alcohol and behenyl alcohol and arachidyl glucoside, sold under the name Montanov 202 by the company SEPPIC.

The surfactant used more particularly is sucrose monostearate, sucrose distearate or sucrose tristearate and mixtures thereof, methylglucose polyglyceryl-3 distearate and alkylpolyglucosides.

The (4) fatty esters of sorbitan and oxyalkylenated fatty esters of sorbitan which may be used as the above nonionic surfactant may be chosen from the group comprising C_{16}-C_{22} fatty acid esters of sorbitan and oxyethylenated C_{16}-C_{22} fatty acid esters of sorbitan. They may be formed from at least one fatty acid comprising at least one saturated linear alkyl chain containing, respectively,

from 16 to 22 carbon atoms, and from sorbitol or from ethoxylated sorbitol. The oxyethylenated esters may generally comprise from 1 to 100 ethylene glycol units and preferably from 2 to 40 ethylene oxide (EO) units.

These esters may be chosen in particular from stearates, behenates, arachidates, palmitates, and mixtures thereof. Stearates and palmitates are preferably used.

As examples of the above nonionic surfactant that can be used in the present invention, mention may be made of sorbitan monostearate (CTFA name: sorbitan stearate), sold by the company ICI under the name Span 60, sorbitan monopalmitate (CTFA name: sorbitan palmitate), sold by the company ICI under the name Span 40, and sorbitan tristearate 20 EO (CTFA name: polysorbate 65), sold by the company ICI under the name Tween 65.

The (4) oxyalkylenated fatty esters, prefertably ethoxylated fatty esters, which may be used as the above nonionic surfactant, may be esters formed from 1 to 100 ethylene oxide units, preferably from 2 to 60 ethylene oxide units, and more preferably from 2 to 30 ethyle oxide units, and from at least one fatty acid chain containing from 8 to 22 carbon atoms, preferably from 8 to 18 carbon atoms, and more preferably from 8 to 12 carbon atoms. The fatty chain in the esters may be chosen in particular from stearate, behenate, arachidate and palmitate units, and mixtures thereof. Examples of ethoxylated fatty esters which may be mentioned are the ester of stearic acid comprising 40 ethylene oxide units, such as the product sold under the name Myrj 52 (CTFA name: PEG-40 stearate) by the company ICI, as well as the ester of behenic acid comprising 8 ethylene oxide units (CTFA name: PEG-8 behenate), such as the product sold under the name Compritol HD5 ATO by the company Gattefosse.

The (5) block copolymers of ethylene oxide (A) and of propylene oxide (B), which may be used as the above nonionic surfactant, may be chosen in particular from block copolymers of formula (I):

$$HO(C_2H_4O)_x(C_3H_6O)_y(C_2H_4O)_zH \quad (I)$$

in which x, y and z are integers such that x+z ranges from 2 to 100 and y ranges from 14 to 60, and mixtures thereof, and more particularly from the block copolymers of formula (I) having an HLB value ranging from 8.0 to 14.0.

The (6) polyoxyethylenated (1-40 EO) and polyoxypropylenated (1-30 PO) alkyl (C_{16}-C_{30}) ethers, which may be used as the above nonionic surfactant, may be selected from the group consisting of:
PPG-6 Decyltetradeceth-30; Polyoxyethlene (30) Polyoxypropylene (6) Tetradecyl Ether such as those sold as Nikkol PEN-4630 from Nikko Chemicals Co.,
PPG-6 Decyltetradeceth-12; Polyoxyethylene (12) Polyoxypropylene (6) Tetradecyl Ether such as those sold as Nikkol PEN-4612 from Nikko Chemicals Co.,
PPG-13 Decyltetradeceth-24; Polyoxyethylene (24) Polyoxypropylene (13) Decyltetradecyl Ether such as those sold as UNILUBE 50MT-2200B from NOF Corporation,
PPG-6 Decyltetradeceth-20; Polyoxyethylene (20) Polyoxypropylene (6) Decyltetradecyl Ether such as those sold as Nikkol PEN-4620 from Nikko Chemicals Co.,
PPG-4 Ceteth-1; Polyoxyethylene (1) Polyoxypropylene (4) Cetyl Ether such as those sold as Nikkol PBC-31 from Nikko Chemicals Co.,
PPG-8 Ceteth-1; Polyoxyethylene (1) Polyoxypropylene (8) Cetyl Ether such as those sold as Nikkol PBC-41 from Nikko Chemicals Co.,

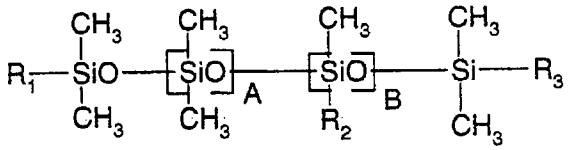
PPG-4 Ceteth-10; Polyoxyethylene (10) Polyoxypropylene (4) Cetyl Ether such as those sold as Nikkol PBC-33 from Nikko Chemicals Co.,
PPG-4 Ceteth-20; Polyoxyethylene (20) Polyoxypropylene (4) Cetyl Ether such as those sold as Nikkol PBC-34 from Nikko Chemicals Co.,
PPG-5 Ceteth-20; Polyoxyethylene (20) Polyoxypropylene (5) Cetyl Ether such as those sold as Procetyl AWS from Croda Inc.,
PPG-8 Ceteth-20; Polyoxyethylene (20) Polyoxypropylene (8) Cetyl Ether such as those sold as Nikkol PBC-44 from Nikko Chemicals Co., and
PPG-23 Steareth-34; Polyoxyethylene Polyoxypropylene Stearyl Ether (34 EO) (23 PO) such as those sold as Unisafe 34S-23 from Pola Chemical Industries. They can provide a composition with stability over a long time, even though the temperature of the composition is increased and decreased in a relatively short period of time.

It may be more preferable that the polyoxyethylenated (1-40 EO) and polyoxypropylenated (1-30 PO) alkyl (C_{16}-C_{30}) ethers are (15-40 EO) and polyoxypropylenated (5-30 PO) alkyl (C_{16}-C_{24}) ethers, which could be selected from the group consisting of PPG-6 Decyltetradeceth-30, PPG-13 Decyltetradeceth-24, PPG-6 Decyltetradeceth-20, PPG-5 Ceteth-20, PPG-8 Ceteth-20, and PPG-23 Steareth-34.

It may be even more preferable that the polyoxyethylenated (1-40 EO) and polyoxypropylenated (1-30 PO) alkyl (C_{16}-C_{30}) ethers are (15-40 EO) and polyoxypropylenated (5-30 PO) alkyl (C_{16}-C_{24}) ethers, which could be selected from the group consisting of PPG-6 Decyltetradeceth-30, PPG-13 Decyltetradeceth-24, PPG-5 Ceteth-20, and PPG-8 Ceteth-20.

As (7) silicone surfactants, which may be used as the above nonionic surfactant, mention may be made of those disclosed in documents US-A-5364633 and US-A-5411744.

The (7) silicone surfactant as the above nonionic surfactant may preferably be a compound of formula (I):

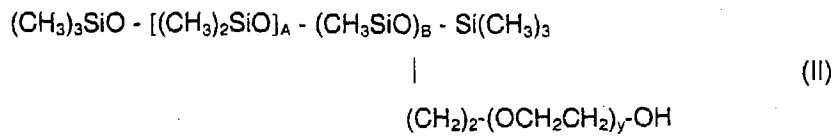


(I)

in which:
R_1, R_2 and R_3, independently of each other, represent a C_1-C_6 alkyl radical or the radical $-(CH_2)_x-(OCH_2CH_2)_y-(OCH_2CH_2CH_2)_z-OR_4$, at least one radical R_1, R_2 or R_3 not being an alkyl radical; R_4 being hydrogen, an alkyl radical or an acyl radical;
A is an integer ranging from 0 to 200;
B is an integer ranging from 0 to 50; with the proviso that A and B are not simultaneously equal to zero;
x is an integer ranging from 1 to 6;
y is an integer ranging from 1 to 30;
z is an integer ranging from 0 to 5.

According to one preferred embodiment of the present invention, in the compound of formula (I), the alkyl radical is a methyl radical, x is an integer ranging from 2 to 6 and y is an integer ranging from 4 to 30.

As examples of silicone surfactants of formula (I), mention may be made of the compounds of formula (II):



(II)

in which A is an integer ranging from 20 to 105, B is an integer ranging from 2 to 10 and y is an integer ranging from 10 to 20.

As examples of silicone surfactants of formula (I), mention may also be made of the compounds of formula (III):

(III)

in which A' and y are integers ranging from 10 to 20.

Compounds of the present invention which may be used are those sold by the company Dow Corning under the names DC 5329, DC 7439-146, DC 2-5695 and Q4-3667. The compounds DC 5329, DC 7439-146 and DC 2-5695 are compounds of formula (II) in which, respectively, A is 22, B is 2 and y is 12; A is 103, B is 10 and y is 12; A is 27, B is 3 and y is 12.

The compound Q4-3667 is a compound of formula (III) in which A is 15 and y is 13.

The amount of the (b) nonionic surfactant(s) in the composition according to the present invention may be 0.1% by weight or more, preferably 1% by weight or more, and more preferably 3% by weight or more relative to the total weight of the composition. It may be even more preferable that the amount of the (b) nonionic surfactant(s) in the composition according to the present invention be 5% by weight or more relative to the total weight of the composition.

On the other hand, the amount of the (b) nonionic surfactant(s) in the composition according to the present invention may be 30% by weight or less, preferably 20% by weight or less, and more preferably 16% by weight or less relative to the total weight of the composition. It may be even more preferable that the amount of the (b) nonionic surfactant(s) in the composition according to the present invention be 12% by weight or less relative to the total weight of the composition.

The amount of the (b) nonionic surfactant(s) in the composition according to the present invention may range from 0.1 to 30% by weight, preferably from 1 to 20% by weight, and more preferably from 3 to 16% by weight relative to the total weight of the composition. It may be even more preferable that the amount of the (b) nonionic surfactant(s) in the composition according to the present invention be from 5% to 12% by weight relative to the total weight of the composition.

(Anionic Surfactant)

The composition according to the present invention comprises (c) at least one anionic surfactant. Two or more anionic surfactants may be used in combination. Thus, a single type of anionic surfactant or a combination of different types of anionic surfactants may be used.

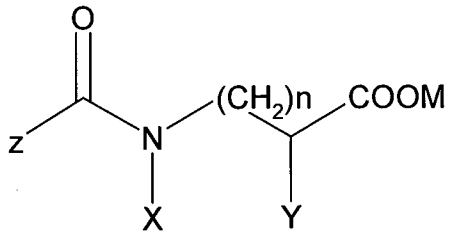
The (c) anionic surfactant(s) may be chosen in particular from amino acid based anionic surfactants, taurates, phosphates and alkyl phosphates, carboxylates, sulphosuccinates, alkyl

sulphates, alkyl ether sulphates, sulphonates, isethionates, alkyl ether carboxylic acids, alkyl sulphoacetates, polypeptides, and their mixtures. Preferably, the (c) anionic surfactant(s) is selected from amino acid based surfactants.

1) Said amino acid based anionic surfactant is derived from a carboxylate salt of amino acid wherein the amine group situated on the α-carbon or β-carbon of an amino acid salt is acylated with a C_8 to C_{22} fatty acid derivative.

The carboxylate salts of these amino acids can be formed by conventional means such as by neutralization of the respective amino acid with a base. The amine group situated on the α-carbon or β-carbon of the neutralized amino acid is acylated with a fatty acid halide (acyl halide) in the presence of a base via the well-known Schotten-Baumann reaction giving the amide, thus forming the desired surfactant reaction product, i.e. the amino acid surfactant. Suitable acyl halides for acylation of the amino acid carboxylate salt include acyl chlorides, bromides, fluorides, and iodides. The acyl halides can be prepared by reacting a saturated or unsaturated, linear or branched C_8 to C_{22} fatty acid with a thionyl halide (bromide, chloride, fluoride, and iodide). Representative acyl halides include but are not limited to the acyl chlorides selected from decanoyl chloride, dodecanoyl chloride (lauroyl chloride), cocoyl chloride (coconut oil derived fatty acid chlorides) tetradecanoyl chloride (myristoyl chloride), hexadecanoyl chloride (palmitoyl chloride), octadecanoyl chloride (stearoyl chloride), 9-octadecenoyl chloride (oleoyl chloride), eicosanoyl chloride (arachidoyl chloride), docosanoyl chloride (behenoyl chloride), and any mixture thereof. Other acyl halides include the bromides, fluorides and iodides of the foregoing fatty acids. A method for preparing acyl halides as well as an alternative method for acylating amino acids is set forth in US Patent Application Publication No. 2008/0200704, published on August 21, 2008, which application is incorporated herein by reference.

In one embodiment, said amino acid based anionic surfactant is represented by the formula (IV):



(IV)

wherein:
Z represents a saturated or unsaturated, linear or branched hydrocarbon group having 8 to 22 carbon atoms,
X is hydrogen or methyl group,
n is 0 or 1,
Y is selected from hydrogen, $-CH_3$, $-CH(CH_3)_2$, $-CH_2CH(CH_3)_2$, $-CH(CH_3)CH_2CH_3$, $-CH_2C_6H_5$, $-CH_2C_2H_4OH$, $-CH_2OH$, $-CH(OH)CH_3$, $-(CH_2)_4NH_2$, $-(CH_2)_3NHC(NH)NH_2$, $-CH_2C(O)O^-M^+$, $-(CH_2)_2C(O)OH$, $-(CH_2)_2C(O)O^-M^+$, and
M is a salt-forming cation wherein COO is the counter-anion, such as for example sodium, potassium, ammonium, or triethanolamine.

According to a preferred embodiment of the present invention, in the amino fatty acid of formula (IV):
Z represents a saturated or unsaturated, linear C_8 to C_{18} alkyl group, in particular a cocoyl group,

X is hydrogen,
n is 0,
Y is hydrogen, and
M is a salt-forming cation wherein COO is the counter-anion, such as for example sodium, potassium, ammonium, or triethanolamine.

Examples of the amino acid surfactants are salts of alanine, arginine, aspartic acid, glutamic acid, glycine, isoleucine, leucine, lysine, phenylalanine, serine, tyrosine, valine, sarcosine, and any mixture thereof. More specifically, mention can be made of the amino acid surfactants such as dipotassium capryloyl glutamate, dipotassium undecylenoyl glutamate, disodium capryloyl glutamate, disodium cocoyl glutamate, disodium lauroyl glutamate, disodium stearoyl glutamate, disodium undecylenoyl glutamate, potassium capryloyl glutamate, potassium cocoyl glutamate, potassium lauroyl glutamate, potassium myristoyl glutamate, potassium stearoyl glutamate, potassium undecylenoyl glutamate, sodium capryloyl glutamate, sodium cocoyl glutamate, sodium lauroyl glutamate, sodium myristoyl glutamate, sodium olivoyl glutamate, sodium palmitoyl glutamate, sodium stearoyl glutamate, sodium undecylenoyl glutamate, cocoyl methyl β-alaninate, lauroyl β-alaninate, lauroyl methyl β-alaninate, myristoyl β-alaninate, potassium lauroyl methyl β-alaninate, sodium cocoyl alaninate, sodium cocoyl methyl β-alaninate and sodium myristoyl methyl β-alaninate, sodium palmitoyl glycinate, sodium lauroyl glycinate, sodium cocoyl glycinate, sodium myristoyl glycinate, potassium lauroyl glycinate, potassium cocoyl glycinate, potassium lauroyl sarcosinate, potassium cocoyl sarcosinate, sodium cocoyl sarcosinate, sodium lauroyl sarcosinate, sodium myristoyl sarcosinate, sodium oleoyl sarcosinate, sodium palmitoyl sarcosinate ammonium lauroyl sarcosinate, sodium lauroyl aspartate, sodium myristoyl aspartate, sodium cocoyl aspartate, sodium caproyl aspartate, disodium lauroyl aspartate, disodium myristoyl aspartate, disodium cocoyl aspartate, disodium caproyl aspartate, potassium lauroyl aspartate, potassium myristoyl aspartate, potassium cocoyl aspartate, potassium caproyl aspartate, dipotassium lauroyl aspartate, dipotassium myristoyl aspartate, dipotassium cocoyl aspartate, dipotassium caproyl aspartate, and mixtures thereof.

Reference can be made to the commercially available amino acid surfactants of, for example:
- sarcosinates, such as sodium lauroyl sarcosinate, sold under the name Sarkosyl NL 97® by Ciba or sold under the name Oramix L 30® by Seppic, sodium myristoyl sarcosinate, sold under the name Nikkol Sarcosinate MN® by Nikkol, or sodium palmitoyl sarcosinate, sold under the name Nikkol Sarcosinate PN® by Nikkol;
- alaninates, such as sodium N-lauroyl-N-methylamidopropionate, sold under the name Sodium Nikkol Alaninate LN 30® by Nikkol or sold under the name Alanone ALE® by Kawaken, or triethanolamine N-lauroyl-N-methylalanine, sold under the name Alanone ALTA® by Kawaken;
- glutamates, such as triethanolamine monococoyl glutamate, sold under the name Acylglutamate CT-12® by Ajinomoto, triethanolamine lauroyl glutamate, sold under the name Acylglutamate LT-12® by Ajinomoto;
- aspartates, such as the mixture of triethanolamine N-lauroyl aspartate and triethanolamine N-myristoyl aspartate, sold under the name Asparack® by Mitsubishi;
- glycine derivatives (glycinates), such as sodium N-cocoyl glycinate, sold under the names Amilite GCS-12® and Amilite GCK 12 by Ajinomoto;
- citrates, such as the citric monoester of oxyethylenated (9 mol) coco alcohols, sold under the name Witconol EC 1129 by Goldschmidt; and
- galacturonates, such as sodium dodecyl D-galactoside uronate, sold by Soliance.

2) Mention may be made, as taurates, of the sodium salt of palm kernel oil methyltaurate,

sold under the name Hostapon CT Paté® by Clariant; N-acyl-N-methyltaurates, such as sodium N-cocoyl-N-methyltaurate, sold under the name Hostapon LT-SF® by Clariant or sold under the name Nikkol CMT-30-T® by Nikkol, sodium palmitoyl methyltaurate, sold under the name Nikkol PMT® by Nikkol, or sodium steraroyl methyltaurate, sold under the name Sunsoft O-30S by Taiyo Kagaku.

3) Mention may be made, as phosphates and alkyl phosphates, for example, of monoalkyl phosphates and dialkyl phosphates, such as lauryl monophosphate, sold under the name MAP 20® by Kao Chemicals, the potassium salt of dodecyl phosphate, the mixture of mono- and diesters (predominantly diester) sold under the name Crafol AP-31® by Cognis, the mixture of octyl phosphate monoester and diester, sold under the name Crafol AP-20® by Cognis, the mixture of ethoxylated (7 mol of EO) 2-butyloctyl phosphate monoester and diester, sold under the name Isofol 12 7 EO-Phosphate Ester® by Condea, the potassium or triethanolamine salt of mono(C_{12}-C_{13})alkyl phosphate, sold under the references Arlatone MAP 230K-40® and Arlatone MAP 230T-60® by Uniqema, potassium lauryl phosphate, sold under the name Dermalcare MAP XC-99/09® by Rhodia Chimie, and potassium cetyl phosphate, sold under the name Arlatone MAP 160K by Uniqema.

4) Mention may be made, as carboxylates, of:

- amido ether carboxylates (AEC), such as sodium lauryl amido ether carboxylate (3 EO), sold under the name Akypo Foam 30® by Kao Chemicals;
- polyoxyethylenated carboxylic acid salts, such as oxyethylenated (6 EO) sodium lauryl ether carboxylate (65/25/10 C_{12}-C_{14}-C_{16}), sold under the name Akypo Soft 45 NV® by Kao Chemicals, polyoxyethylenated and carboxymethylated fatty acids originating from olive oil, sold under the name Olivem 400® by Biologia E Tecnologia, or oxyethylenated (6 EO) sodium tridecyl ether carboxylate, sold under the name Nikkol ECTD-6NEX® by Nikkol; and
- salts of fatty acids (soaps) having a C_6 to C_{22} alkyl chain which are neutralized with an organic or inorganic base, such as potassium hydroxide, sodium hydroxide, triethanolamine, N-methylglucamine, lysine and arginine.

5) Mention may be made, as sulphosuccinates, for example, of oxyethylenated (3 EO) lauryl (70/30 C_{12}/C_{14}) alcohol monosulphosuccinate, sold under the names Setacin 103 Special® and Rewopol SB-FA 30 K 4® by Witco, the disodium salt of a hemisulphosuccinate of C_{12}-C_{14} alcohols, sold under the name Setacin F Special Paste® by Zschimmer Schwarz, oxyethylenated (2 EO) disodium oleamidosulphosuccinate, sold under the name Standapol SH 135® by Cognis, oxyethylenated (5 EO) lauramide monosulphosuccinate, sold under the name Lebon A-5000® by Sanyo, the disodium salt of oxyethylenated (10 EO) lauryl citrate monosulphosuccinate, sold under the name Rewopol SB CS 50® by Witco, or ricinoleic monoethanolamide monosulphosuccinate, sold under the name Rewoderm S 1333® by Witco. Use may also be made of polydimethylsiloxane sulphosuccinates, such as disodium PEG-12 dimethicone sulphosuccinate, sold under the name Mackanate-DC 30 by MacIntyre.

6) Mention may be made, as alkyl sulphates, for example, of triethanolamine lauryl sulphate (CTFA name: TEA lauryl sulphate), such as the product sold by Huntsman under the name Empicol TL40 FL or the product sold by Cognis under the name Texapon T42, which products are at 40% in aqueous solution. Mention may also be made of ammonium lauryl sulphate (CTFA name: ammonium lauryl sulphate), such as the product sold by Huntsman under the name Empicol AL 30FL, which is at 30% in aqueous solution.

7) Mention may be made, as alkyl ether sulphates, for example, of sodium lauryl ether

sulphate (CTFA name: sodium laureth sulphate), such as that sold under the names Texapon N40 and Texapon AOS 225 UP by Cognis, or ammonium lauryl ether sulphate (CTFA name: ammonium laureth sulphate), such as that sold under the name Standapol EA-2 by Cognis.

8) Mention may be made, as sulphonates, for example, of α-olefinsulphonates, such as sodium α-olefinsulphonate (C_{14}-C_{16}), sold under the name Bio-Terge AS-40® by Stepan, sold under the names Witconate AOS Protégé® and Sulframine AOS PH 12® by Witco or sold under the name Bio-Terge AS-40 CG® by Stepan, secondary sodium olefinsulphonate, sold under the name Hostapur SAS 30® by Clariant; or linear alkylarylsulphonates, such as sodium xylenesulphonate, sold under the names Manrosol SXS30®, Manrosol SXS40® and Manrosol SXS93® by Manro.

9) Mention may be made, as isethionates, of acylisethionates, such as sodium cocoylisethionate, such as the product sold under the name Jordapon CI P® by Jordan.

10) Mention may be made of, as the alkyl ether carboxylic acids, polyoxyalkylene alkyl ether carboxylic acids, such as compounds corresponding to formula (IV):

$$RO[CH_2O]_u[(CH_2)_xCH(R')(CH_2)_y(CH_2)_zO]_v[CH_2CH_2O]_wCH_2COOH \quad (V)$$

wherein:
R is a hydrocarbon radical containing from 6 to 40 carbon atoms;
u, v and w, independently of one another, represent numbers from 0 to 60;
x, y and z, independently of one another, represent numbers from 0 to 13;
R' represents hydrogen, alkyl, preferably C_1-C_{12} alkyl; and
the sum of x+y+z is 0 or more.

In formula (V), R can be linear or branched, acyclic or cyclic, saturated or unsaturated, aliphatic or aromatic, substituted or unsubstituted. As examples of the substituent, mention may be made of a monovalent functional group such as a halogen atom, a hydroxyl group, a C_1-C_6 alkoxy group, an amino group, a C_1-C_6 alkylamino group, a C_1-C_6 dialkylamino group, a nitro group, a carbonyl group, an acyl group, a carboxyl group, a cyano group and the like. Typically, R is a linear or branched, acyclic C_6-C_{40} alkyl or alkenyl group or a C_1-C_{40} alkyl phenyl group, more typically a C_8-C_{24} alkyl or alkenyl group or a C_4-C_{20} alkyl phenyl group, and even more typically a C_{10}-C_{18} alkyl group or alkenyl group or a C_6-C_{16} alkyl phenyl group, which may be substituted; u, v, w, independently of one another, is typically a number from 2 to 20, more typically a number from 3 to 17, and most typically a number from 5 to 15; x, y, and z, independently of one another, are typically a number from 2 to 13, more typically a number from 1 to 10, and most typically a number from 0 to 8;

The polyoxyethylene alkyl ether carboxylic acids, corresponding to formula (V) can be obtained by alkoxylation of alcohols ROH with ethylene oxide as the sole alkoxide or with several alkoxides and subsequent oxidation. The numbers u, v, and w each represent the degree of alkoxylation. Whereas, on a molecular level, the numbers u, v and w and the total degree of alkoxylation can only be integers, including zero, on a macroscopic level they are mean values in the form of broken numbers. The fatty ether carboxylic acids may include polyoxyalkylenated (C_6-C_{30})alkyl ether carboxylic acids and their salts, more specifically polyoxyethylenated (C_6-C_{30}) alkyl ether carboxylic acids and their salts; polyoxyalkylenated (C_6-C_{30})alkylaryl ether carboxylic acids and their salts; and polyoxyalkylenated (C_6-C_{30})alkylamido ether carboxylic acids. Preferably, the fatty ether carboxylic acids are polyoxyethylene (3) to (17) lauryl ether carboxylic

acids.

As suitable alkyl ether carboxylic acids, mention be made of polyoxyalkylenated (C_6-C_{24})alkyl ether carboxylic acids and salts thereof, in particular those comprising from 2 to 50 alkylene oxide and in particular ethylene oxide groups, such as the compounds sold by the company Kao under the name Akypo. The salts are chosen in particular from alkali metal salts, especially of sodium, ammonium salts, amine salts, salts of amino alcohols such as triethanolamine or monoethanolamine, and magnesium salts.

The polyoxyalkylenated (C_6-C_{24})alkyl ether carboxylic acids can be represented by the following formula (VI):

$$R_1\text{-}(OC_2H_4)_n\text{-}OCH_2COOA \quad (VI)$$

in which:
R_1 represents a linear or branched C_8-C_{22} alkyl or alkenyl radical or mixture of radicals, a (C_8-C_9)alkylphenyl radical, a radical $R_2CONH\text{-}CH_2\text{-}CH_2$- with R_2 denoting a linear or branched C_{11}-C_{21} alkyl or alkenyl radical;
n is an integer or decimal number (average value) that may range from 2 to 24 and preferably from 2 to 10, the alkyl radical containing between 6 and 20 carbon atoms approximately and preferably from 8 to 18 carbon atoms, and aryl preferably denoting phenyl; and
A denotes a hydrogen atom, an ammonium group, Na, K, Li, Mg or a monoethanolamine or triethanolamine residue, preferably a hydrogen or sodium atom, more particularly a sodium atom.

Preferentially, R_1 represents a linear or branched C_8-C_{22} alkyl or alkenyl radical or a (C_8-C_9)alkylphenyl radical. In particular, R_1 denotes a (C_{12}-C_{14})alkyl, cocoyl or oleyl radical or mixture of radicals; a nonylphenyl or octylphenyl radical.

Among the commercial products that may preferably be used are the products sold by the company Kao under the names:
Akypo NP 70 (R_1 = nonylphenyl, n = 7, and A= H in the formula (VI));
Akypo NP 40 (R_1 = nonylphenyl, n = 4, and A = H in the formula (VI));
Akypo OP 40 (R_1 = octylphenyl, n = 4, and A = H in the formula (VI));
Akypo OP 80 (R_1 = octylphenyl, n = 8, and A = H in the formula (VI));
Akypo OP1 90 (R_1 = octylphenyl, n = 19, and A = H in the formula (VI));
Akypo RLM 38 (R_1 = (C_{12}-C_{14})alkyl, n = 3.8, and A= H in the formula (VI));
Akypo RLM 3 8 NV (R_1 = (C_{12}-C_{14})alkyl, n = 4, and A = Na in the formula (VI));
Akypo RLM 45 (R = (C_{12}-C_{14})alkyl, n = 4.5, and A = H, in the formula (VI));
Akypo RLM 45 NV (R_1 = (C_{12}-C_{14})alkyl, n = 4.5, and A = Na, in the formula (VI));
Akypo RLM 100 (R_1 = (C_{12}-C_{14})alkyl, n = 10, and A = H in the formula (VI));
Akypo RLM I 00 NV (R_1 = (C_{12} -C_{14})alkyl, n = 10, and A = Na in the formula (VI)); and
Akypo RLM 160 NV (R_1 = (C_{12}-C_{14})alkyl, n = 16, and A= Na in the formula (VI)).

The amount of the (c) anionic surfactant(s) in the composition according to the present invention may be 0.01% by weight or more, preferably 0.05% by weight or more, and more preferably 0.1% by weight or more relative to the total weight of the composition. It may be even more preferable that the amount of the (c) anionic surfactant(s) in the composition according to the present invention be 0.15% by weight or more relative to the total weight of the composition.

On the other hand, the amount of the (c) anionic surfactant(s) in the composition according to the

present invention may be 10% by weight or less, preferably 5% by weight or less, and more preferably 1% by weight or less relative to the total weight of the composition. It may be even more preferable that the amount of the (c) anionic surfactant(s) in the composition according to the present invention be 0.5% by weight or less relative to the total weight of the composition.

The amount of the (c) anionic surfactant(s) in the composition according to the present invention may range from 0.01 to 10% by weight, preferably from 0.05 to 5% by weight, and more preferably from 0.1 to 1% by weight relative to the total weight of the composition. It may be even more preferable that the amount of the (c) anionic surfactant(s) in the composition according to the present invention be from 0.15% to 0.5% by weight relative to the total weight of the composition.

(Betaine)

The composition according to the present invention comprises (d) at least one betaine. A single type of specific betaine may be used, but two or more different types of specific betaines may be used in combination.

The term "betaine" here means an amphoteric compound having a positively charged cationic moiety and a negatively charged anionic moiety, wherer no hydrogen atom is bound to a positively charged atom in the positively charged cationic moiety and the positively charged cationic moiety may not be adjacent to the negatively charged anionic moiety.

For the purpose of the present invention, the (d) betaine here is not a surfactant, which comprises at least one hydrophilic part and at least one hydrophobic part.

The positively charged cationic moiety in the betaine includes, but is not limited to, a quaternary ammonium cation, a phosphonium cation, and a sulfonium cation. Preferably, the betaine includes a quaternary ammonium cation as the positively charged cationic moiety.

The negatively charged anionic moiety in the betaine includes, but is not limited to, a carboxylate anion.

The betaine preferably comprises at least one selected from trimethyl glycine, carnitine, and L-proline betaine or stachydrine, and more preferably the betaine comprises trimethyl glycine.

The amount of the (d) betaine(s) in the composition according to the present invention may be 0.01% by weight or more, preferably 0.1% by weight or more, and more preferably 0.3% by weight or more relative to the total weight of the composition. It may be even more preferable that the amount of the (d) betaine(s) in the composition according to the present invention be 0.5% by weight or more relative to the total weight of the composition.

On the other hand, the amount of the (d) betaine(s) in the composition according to the present invention may be 15% by weight or less, preferably 10% by weight or less, and more preferably 5% by weight or less relative to the total weight of the composition. It may be even more preferable that the amount of the (d) betaine(s) in the composition according to the present invention be 3% by weight or less relative to the total weight of the composition.

The amount of the (d) betaine(s) in the composition according to the present invention may range from 0.01 to 15% by weight, preferably from 0.1 to 10% by weight, and more preferably from 0.3

to 5% by weight relative to the total weight of the composition. It may be even more preferable that the amount of the (d) betaine(s) in the composition according to the present invention be from 0.5% to 3% by weight relative to the total weight of the composition.

(Water)

The composition according to the present invention includes (e) water.

The amount of the (e) water in the composition according to the present invention is 30% by weight or more, preferably 40% by weight or more, and more preferably 50% by weight or more relative to the total weight of the composition.

On the other hand, the amount of the (e) water in the composition according to the present invention may be 90% by weight or less, preferably 80% by weight or less, and more preferably 70% by weight or less relative to the total weight of the composition.

The amount of (e) water in the composition according to the present invention may be from 30 to 90% by weight, preferably from 40 to 80% by weight, and more preferably from 50 to 70% by weight relative to the total weight of the composition.

(Polyol)

The cosmetic composition according to the present invention may comprise at least one polyol. A single type of polyol may be used, but two or more different types of polyols may be used in combination.

The term "polyol" here means an alcohol having two or more hydroxy groups, and does not encompass a saccharide or a derivative thereof. The derivative of a saccharide includes a sugar alcohol which is obtained by reducing one or more carbonyl groups of a saccharide, as well as a saccharide or a sugar alcohol in which the hydrogen atom or atoms in one or more hydroxy groups thereof has or have been replaced with at least one substituent such as an alkyl group, a hydroxyalkyl group, an alkoxy group, an acyl group or a carbonyl group.

The polyol may be a C_2-C_{12} polyol, preferably a C_2-C_9 polyol, comprising at least 2 hydroxy groups, and preferably 2 to 5 hydroxy groups. The polyol may be a natural or synthetic polyol. The polyol may have a linear, branched or cyclic molecular structure.

The polyol may be selected from glycerins and derivatives thereof, and glycols and derivatives thereof. The polyol may be selected from the group consisting of glycerin, diglycerin, polyglycerin, ethyleneglycol, diethyleneglycol, propyleneglycol, dipropyleneglycol, butyleneglycol, pentyleneglycol, hexyleneglycol, 1,3-propanediol, and 1,5-pentanediol.

The polyol may be present in an amount ranging from 0.1% to 50% by weight, and preferably from 1% to 40% by weight, such as from 10% to 30% by weight, relative to the total weight of the composition.

(Associative Polyurethane)

The cosmetic composition according to the present invention may comprise at least one associative polyurethane. A single type of associative polyurethane may be used, but two or more different types of associative polyurethanes may be used in combination.

For the purpose of the present invention, the term "associative polyurethane" refers to polyurethanes that are capable, in a medium, of reversibly associating with each other.

The associative polyurethane may comprise at least one hydrophilic part and at least one hydrophobic part. For the purpose of the present invention, the term "hydrophobic group" means a radical or polymer with a saturated or unsaturated, linear or branched hydrocarbon-based chain, comprising at least 10 carbon atoms, preferably from 10 to 30 carbon atoms, in particular from 12 to 30 carbon atoms and more preferentially from 16 to 30 carbon atoms.

The associative polyurethane may be cationic or nonionic, preferably nonionic. More particularly, said polymers contain in their chain both hydrophilic sequences most often of a polyoxyethylenated nature and hydrophobic sequences which may be aliphatic linkages alone and/or cycloaliphatic and/or aromatic linkages.

Preferably, these polyether-polyurethanes comprise at least two lipophilic hydrocarbon chains, having from 6 to 30 carbon atoms, preferably from 6 to 20, separated by a hydrophilic sequence, it being possible for the hydrocarbon chains to be pendent chains or chains at the end of a hydrophilic sequence. In particular, it is possible for one or more pendent chains to be envisaged. In addition, the polymer may comprise a hydrocarbon chain at one end or at both ends of a hydrophilic sequence.

The polyether-polyurethanes may be polyblocks, in particular in triblock form. The hydrophobic sequences may be at each end of the chain (for example: triblock copolymer with hydrophilic central sequence) or distributed both at the ends and in the chain (polyblock copolymer for example). These same polymers may also be in the form of graft units or may be star-shaped.

Still more particularly, according to the present invention, it is preferable to use a polyether-polyurethane which can be obtained by polycondensation of at least three compounds comprising (i) at least one polyethylene glycol comprising from 100 to 180 mol of ethylene oxide, (ii) stearyl alcohol or decyl alcohol, which may comprise 1 to 150 ethylene glycol units, and (iii) at least one diisocyanate.

Such polyether-polyurethanes are sold in particular by the company ROHM & HAAS under the names Aculyn 46® and Aculyn 44® [ACULYN 46® is a polycondensate of polyethylene glycol containing 150 or 180 mol of ethylene oxide, stearyl alcohol and methylenebis(4-cyclohexyl isocyanate) (SMDI), at 15% by weight in a matrix of maltodextrin (4%) and water (81%); ACULYN 440 is a polycondensate of polyethylene glycol containing 150 or 180 mol of ethylene oxide, decyl alcohol and methylenebis(4-cyclohexyl isocyanate) (SMDI), at 35% by weight in a mixture of propylene glycol (39%) and water (26%)].

According to the present invention, it is preferable that the associative polyurethane be Steareth-100/PEG-136/HDI Copolymer sold by the company Rheox under the name of Rheolate FX 1100.

The amount of the associative polyurethane is not limited, and may range from 0.01 to 10% by weight, preferably from 0.1 to 5% by weight, and more preferably from 0.4 to 3% by weight, relative to the total weight of the composition.

(Optional Additives)

The composition according to the present invention may also comprise any optional additive(s) usually used in the field of cosmetics, chosen, for example, from cationic or amphoteric surfactants, solvents, gums, resins, hydrophilic thickening agents, hydrophobic thickening agents, dispersants, antioxidants, such as hydroxyacetophenon, film-forming agents, preserving agents, sach as salicylic acid and phenoxyethanol, fragrances, neutralizers, pH adjusting agents, antiseptics, UV-screening agents, cosmetic active agents such as vitamins, moisturizers, emollients or collagen-protecting agents, and mixtures thereof.

It is a matter of routine operations for a person skilled in the art to adjust the nature and amount of the above optional additives which may be present in the composition in accordance with the present invention such that the desired cosmetic properties are not thereby affected.

In one preferred embodiment of the present invention, the composition is in the form of an oil-in-water emulsion, comprising:
(a) at least one ether oil;
(b) at least one nonionic surfactant of polyglyceryl fatty acid ester;
(c) at least one amino acid based anionic surfactant;
(d) at least one betaine; and
(e) water.

In another preferred embodiment of the present invention, the composition is in the form of an oil-in-water emulsion, comprising:
(a) at least one ether oil;
(b) nonionic surfactants comprising at least one of polyglyceryl fatty acid monoester and at least one polyglyceryl fatty acid diester;
(c) at least one amino acid based anionic surfactant;
(d) at least one betaine; and
(e) water.

The composition according to the present invention can be prepared by mixing the above-described essential and optional ingredients in a conventional manner.

For example, the composition according to the present invention can be prepared by a process comprising the step of
mixing
(a) at least one ether oil;
(b) at least one nonionic surfactant;
(c) at least one anionic surfactant;
(d) at least one betaine; and

(e) water

.

It is possible to further mix any of the optional ingredients.

[Cosmetic Composition]

The composition according to the present invention may preferably be used as a cosmetic composition. Thus, the composition according to the present invention may be intended for application onto a keratin substance. Keratin substance here means a material containing keratin as a main constituent element, and examples thereof include the skin, scalp, nails, lips, hair, eyelashes, eyebrows, and the like. Thus, it is preferable that the composition according to the present invention be used for a cosmetic process for the keratin substance.

It is preferable that the composition according to the present invention be a cleansing composition, more preferably a makeup remover, in particular a makeup remover for removing makeup from the keratin substance.

It is preferable that the composition according to the present invention have good fluidity while it has enhanced viscosity such that the composition does not drip off from the keratin substance.

[Process and Use]

The composition according to the present invention can be used for a non-therapeutic process, such as a cosmetic process, for treating a keratin substance such as skin, hair, mucous membranes, nails, eyelashes, eyebrows, and the scalp, by being applied to the keratin substance.

It is preferable that the process according to the present invention be a cleansing process, in particular, for washing out make-up products such as mascara from the keratin substance.

The composition according to the present invention can be used as it is or in a cosmetic product, preferably a cleansing product. In particular, the composition according to the present invention may preferably be a cleansing product such as a make-up removing product for the body and/or facial skin, or keratin fibers such as hair, eyelashes, and eyebrows. Alternatively, the composition according to the present invention can be used as an element of the above product. For example the composition according to the present invention can be added to or combined with any other elements to form the above product.

The present invention also relates to a use of a combination of (c) at least one anionic surfactant and (d) at least one betaine in a composition, in the form of an oil-in-water emulsion, comprising (a) at least one ether oil, (b) at least one nonionic surfactant and (e) water, in order to make and maintain the oil droplet size in the composition less than 100 nm, preferably less than 90 nm, and more preferably less than 80 nm.

The composition used in the process and use according to the composition may include any of the optional ingredients as explained above for the composition according to the present invention.

EXAMPLES

The present invention will be described in more detail by way of examples which however should not be construed as limiting the scope of the present invention.

[Microemulsion Gel]

The following compositions in the form of microemulsion gel according to Example 1 (Ex. 1) and Comparative Examples 1 to 3 (Comp. Ex. 1 to 3), shown in Table 1, were prepared by mixing the components shown in Table 1. The numerical values for the amounts of the components shown in Table 1 are all based on "% by weight" as active raw materials.

[Evaluation]

(Volume Average Particle Diameter)

The volume average particle diameter of the dispersed oil droplets in each of the compositions according to Example 1 (Ex. 1) and Comparative Examples 1 to 3 (Comp. Ex. 1 to 3), was measured with ELSZ-2000 zeta-potential & particle size analyzer from Otsuka Electronics just after it was prepared (T0), and after it was stored at 4°C, 25°C, or 45°C for 2 months.

The evaluation results are summarized in Table 1 below. "P.S." in Table 1 stands for phase separation.

Table 1

Ingredients		Ex. 1	Comp. Ex. 1	Comp. Ex. 2	Comp. Ex. 3
Trimethyl Glycine		1	-	1	-
Hydroxyacetophenone		0.3	0.3	0.3	0.3
Dicaprylyl Ether		9	9	9	9
Steareth-100/PEG-136/HDI Copolymer		1.5	1.5	1.5	1.5
Salicylic Acid		0.1	0.1	0.1	0.1
Phenoxyethanol		0.3	0.3	0.3	0.3
Glycerin		20	20	20	20
Propanediol		3	3	3	3
Sodium Cocoyl Glycinate		0.24	-	-	0.24
Polyglyceryl-6 Dicaprate		6	6	6	6
Polyglyceryl-6 Caprylate		4	4	4	4
Water		QS 100	QS 100	QS 100	QS 100
Evaluation					
Volume-Average Particle Size of Oil Droplets (nm)	T0	62.7	1922.2	1306.5	76.5
	4°C, 2 months	60.5	P.S.	P.S.	637.7
	25°C, 2 months	63.3	P.S.	P.S.	76.5
	45°C, 2 months	64.9	P.S.	P.S.	77.3

As can be seen from Table 1, the compositions according to Example 1, which includes the specific combination of ingredients (a) to (e) of the present invention, exhibited good stability since it maintained the fine emulsion state even after stored for two months at 4°C to 45°C.

On the other hand, the composition according to each of Comparative Examples 1, which lacks

the betaine and the anionic surfactant, showed inferior stability at 4°C to 45°C. The composition according to Comparative Example 2, which lacks the anionic surfactant, also showed inferior stability at 4°C to 45°C. In addition, the composition according to Comparative Example 3, which lacks the betaine and includes an additional nonionic surfactant instead of the anionic surfactant, also showed inferior stability at 4°C to 45°C.

[Microemulsion]

The following compositions in the form of microemulsions according to Example 2 (Ex. 2) and Comparative Examples 4 to 7 (Comp. Ex. 4 to 7), shown in Table 2, were prepared by mixing the components shown in Table 2. The numerical values for the amounts of the components shown in Table 2 are all based on "% by weight" as active raw materials.

[Evaluation]

The volume average particle diameter of the dispersed oil droplets in each of the compositions according to Example 2 (Ex. 2) and Comparative Examples 4 to 7 (Comp. Ex. 4 to 7), was measured with ELSZ-2000 zeta-potential & particle size analyzer from Otsuka Electronics just after it was prepared (T0), and after it was stored at 4°C, 25°C, or 45°C for 2 months.

The evaluation results are summarized in Table 2 below. "P.S." in Table 2 stands for phase separation.

Table 2

Ingredients		Ex. 2	Comp. Ex. 4	Comp. Ex. 5	Comp. Ex. 6	Comp. Ex. 7
Trimethyl Glycine		2	-	-	2	2
Hydroxyacetophenone		0.3	0.3	0.3	0.3	0.3
Dicaprylyl Ether		9	9	9	9	9
Salicylic Acid		0.1	0.1	0.1	0.1	0.1
Phenoxyethanol		0.2	0.2	0.2	0.2	0.2
Glycerin		25	25	25	25	25
Propanediol		3	3	3	3	3
Sodium Cocoyl Glycinate		0.24	-	0.24	-	-
Polyglyceryl-6 Dicaprate		5	5	5	5	5
Sodium Cocoyl Glutamate		-	-	-	-	0.24
Sodium Lauroyl Lactylate		-	-	-	0.24	-
Polyglyceryl-6 Caprylate		3	3	3	3	3
Water		QS 100	QS 100	QS 100	QS 100	QS 100
Evaluation						
Volume-Average Particle Size of Oil Droplets (nm)	T0	69.3	1602.7	72.5	2005.9	75.1
	4°C, 2 months	70.1	P.S.	824.3	P.S.	966.8
	25°C, 2 months	68.7	P.S.	75.0	P.S.	76.5
	45°C, 2 months	71.2	P.S.	73.4	P.S.	78.2

As can be seen from Table 2, the compositions according to Example 2, which includes the specific combination of ingredients (a) to (e) of the present invention, exhibited good stability

since it maintained the fine emulsion state even after stored for two months at 4°C to 45°C.

On the other hand, the composition according to Comparative Example 4, which lacks the betaine and anionic surfactants, showed inferior stability at 4°C to 45°C. The composition according to Comparative Example 5, which lacks the betaine, also showed inferior stability at 4°C to 45°C. In addition, the compositions according to Comparative Examples 6 and 7, which lacks the anionic surfactant and include an additional nonionic surfactant instead, also showed inferior stability at 4°C to 45°C.

Therefore, it can be concluded that the composition according to the present invention can be very preferable as a composition for cleansing keratinous substances, since it exhibits good stability.

[Example 3 and Example 4]

The following compositions in the form of microemulsion gel was prepared by mixing the components shown in the following tables. The numerical values for the amounts of the components shown in the tables are all based on "% by weight" as active raw materials.

Example 3

Ingredients	%
Trimethyl Glycine	2
Hydroxyacetophenone	0.3
Dicaprylyl Ether	9
PEG-150 Distearate	1.48
Salicylic Acid	0.1
Caprylyl Glycol	0.2
Glycerin	20
Propanediol	3
Sodium Cocoyl Glycinate	0.24
Polyglyceryl-6 Dicaprate	6
Polyglyceryl-6 Caprylate	4
Water	QS 100

Example 4

Ingredients	%
Trimethyl Glycine	4
Hydroxyacetophenone	0.3
Dicaprylyl Ether	9
PEG-120 METHYL GLUCOSE DIOLEATE	2
Salicylic Acid	0.1
Glycerin	25
Propanediol	3
Sodium Cocoyl Glycinate	0.24
Polyglyceryl-6 Dicaprate	6
Polyglyceryl-6 Caprylate	4
PEG-240/HDI COPOLYMER BIS-DECYLTETRADECETH-20 ETHER	0.9
PHENOXYETHANOL	0.3
Water	QS 100

The compositions according Example 3 and Example 4, which include the specific combination of ingredients (a) to (e) of the present invention, exhibited good stability.

CLAIMS

1. A composition in the form of an oil-in-water emulsion, comprising:
   (a) at least one ether oil;
   (b) at least one nonionic surfactant;
   (c) at least one anionic surfactant;
   (d) at least one betaine; and
   (e) water.

2. The composition according to Claim 1, wherein an oil droplet in the composition has a volume-average particle size of less than 100 nm, preferably less than 90 nm, and more preferably less than 80 nm.

3. The composition according to Claim 1 or 2, wherein the amount of the (a) ether oil(s) in the composition ranges from 0.1 to 40% by weight, preferably from 1 to 30% by weight, more preferably from 3 to 20% by weight, relative to the total weight of the composition.

4. The composition according to any one of Claims 1 to 3, wherein the (b) nonionic surfactant is chosen from:
   (1) surfactants chosen from polyglyceryl fatty acid esters, polyoxyalkylenated alkyl glycerides, and polyoxyalkylenated fatty ethers;
   (2) mixed esters of fatty acids or of fatty alcohols, of carboxylic acid and of glycerol;
   (3) fatty acid esters of sugars and fatty alcohol ethers of sugars;
   (4) surfactants chosen from fatty esters of sorbitan and oxyalkylenated fatty esters of sorbitan, and oxyalkylenated fatty esters;
   (5) block copolymers of ethylene oxide (A) and of propylene oxide (B),
   (6) polyoxyethylenated (1-40 EO) and polyoxypropylenated (1-30 PO) alkyl (C_{16}-C_{30}) ethers,
   (7) silicone surfactants, and
   (8) mixtures thereof.

5. The composition according to any one of Claims 1 to 4, wherein the (b) nonionic surfactant is chosen from:
   - polyglyceryl fatty acid esters of at least one, preferably one, fatty acid comprising at least one saturated or unsaturated, linear or branched C_8-C_{22} hydrocarbon group such as a C_8-C_{22} alkyl or alkenyl group, preferably a C_8-C_{18} alkyl or alkenyl group, and more preferably a C_8-C_{12} alkyl or alkenyl group, and of 2-12 glycerols, preferably 2-10 glycerols and more preferably 2-8 glycerols;
   - polyoxyethylenated alkyl glycerides such as polyethylene glycol derivatives of a mixture of mono-, di- and tri-glycerides of caprylic and capric acids (preferably 2 to 30 ethylene oxide units, more preferably 2 to 20 ethylene oxide units, and even more preferably 2 to 10 ethylene oxide units);
   - polyoxyethylenated fatty ethers of at least one, preferably one, fatty alcohol comprising at least one saturated or unsaturated, linear or branched C_8-C_{22} hydrocarbon group such as a C_8-C_{22} alkyl or alkenyl group, preferably a C_8-C_{18} alkyl or alkenyl group, and more preferably a C_8-C_{12} alkyl or alkenyl group, and of 2 to 60 ethylene oxides, preferably from 2 to 30 ethylene oxides, and more preferably from 2 to 10 ethylene oxides; and

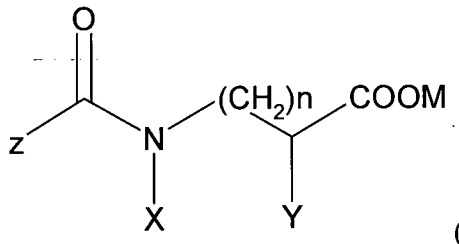
- mixtures thereof.

6. The composition according to any one of Claims 1 to 5, wherein the (b) nonionic surfactant comprises at least one polyglyceryl fatty acid monoester and at least one polyglyceryl fatty acid diester.

7. The composition according to any one of Claims 1 to 6, wherein the amount of the (b) nonionic surfactant(s) in the composition ranges from 0.1 to 30% by weight, preferably from 1 to 20% by weight, and more preferably from 3 to 16% by weight, relative to the total weight of the composition.

8. The composition according to any one of Claims 1 to 7, wherein the (c) anionic surfactant is chosen from amino acid based anionic surfactants.

9. The composition according to any one of Claims 1 to 8, wherein the (c) anionic surfactant is represented by the formula (IV):



(IV)

wherein:
Z represents a saturated or unsaturated, linear or branched hydrocarbon group having 8 to 22 carbon atoms,
X is hydrogen or a methyl group,
n is 0 or 1,
Y is selected from hydrogen, $-CH_3$, $-CH(CH_3)_2$, $-CH_2CH(CH_3)_2$, $-CH(CH_3)CH_2CH_3$, $-CH_2C_6H_5$, $-CH_2C_2H_4OH$, $-CH_2OH$, $-CH(OH)CH_3$, $-(CH_2)_4NH_2$, $-(CH_2)_3NHC(NH)NH_2$, $-CH_2C(O)O^-M^+$, $-(CH_2)_2C(O)OH$, $-(CH_2)_2C(O)O^-M^+$, and
M is a salt-forming cation wherein COO is the counter-anion, such as for example sodium, potassium, ammonium, or triethanolamine.

10. The composition according to any one of Claims 1 to 9, wherein the amount of the (c) anionic surfactant(s) in the composition ranges from 0.01 to 10% by weight, preferably from 0.05 to 5% by weight, and more preferably from 0.1 to 1% by weight, relative to the total weight of the composition.

11. The composition according to any one of Claims 1 to 10, wherein the (d) betaine is chosen from trimethyl glycine, carnitine, and L-proline betaine or stachydrine.

12. The composition according to any one of Claims 1 to 11, wherein the amount of the (d) betaine(s) in the composition ranges from 0.01 to 15% by weight, preferably from 0.1 to 10% by weight, and more preferably from 0.3 to 5% by weight, relative to the total weight of the composition.

13. The composition according to any one of Claims 1 to 12, wherein the amount of the (e)

water in the composition ranges from 30 to 90% by weight, preferably from 40 to 80% by weight, and more preferably from 50 to 70% by weight, relative to the total weight of the composition.

14. The composition according to any one of Claims 1 to 13, which is used as it is or used for a cleansing product, preferably a make-up cleansing product for skin, and more preferably a make-up cleansing product for the body and/or the face.

15. A process for cleansing a keratin substance such as skin, hair, mucous membranes, nails, eyelashes, eyebrows and the scalp, comprising the step of applying the composition according to any one of Claims 1 to 13 to the keratin substance.

INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2019/048366

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K8/04 A61K8/06 A61K8/33 A61K8/365 A61K8/39
A61K8/44 A61Q1/14 A61Q19/10 A61K8/46 A61K8/60
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61K A61Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2010/060896 A1 (HENKEL AG & CO KGAA [DE]; JANSEN FRANK [DE]; HENTREY STEFANIE [DE]) 3 June 2010 (2010-06-03) examples 1-3	1-5, 7-10,12, 13
X	US 2015/335538 A1 (BERNARD ANNE-LAURE [JP] ET AL) 26 November 2015 (2015-11-26) the whole document	1-15
X	DATABASE GNPD [Online] MINTEL; 16 February 2018 (2018-02-16), anonymous: "Facial Wash", XP055618099, retrieved from www.gnpd.com Database accession no. 5458645 the whole document	1,2,4,5, 14,15

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 March 2020	26/03/2020

Name and mailing address of the ISA/	Authorized officer
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1

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	DATABASE GNPD [Online] MINTEL; 20 July 2017 (2017-07-20), anonymous: "Lemon Shower Gel", XP055618098, retrieved from www.gnpd.com Database accession no. 4970839 the whole document -----	1,2,4,5, 14,15
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E	WO 2019/240242 A1 (OREAL [FR]; NAKASHIMA NAHOKO [JP]; HU FAN [JP]) 19 December 2019 (2019-12-19) the whole document -----	1-15

1

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Information on patent family members

International application No
PCT/JP2019/048366

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