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(54) Title of the Invention: **Cleaning compositions comprising biosurfactants in a foam dispenser**
Abstract Title: **A cleaning agent system comprising a biosurfactant based cleaning agent and a foam dispenser**

(57) A cleaning agent system comprising a foam dispenser and a cleaning agent in which the surfactant content of the cleaning agent comprises 95-100 wt.%. biosurfactant. The cleaning agent may be provided as a concentrate and may be provided in a bag. The foam dispenser may be a foam pump. The biosurfactant may comprise glycolipids, such as rhamnolipid, sophorolipid or mannosylerythritol lipid, or lipopeptides such as surfactin, fatty acyl glutamates or fatty acyl glycinates or combinations thereof. The carrier may be water. The cleaning agent may be a cosmetic cleaning agent, in particular for the face, body or hands. Other ingredients including thickeners, preservatives, perfumes or caring substances may be present.

GB 2547294 A

"Cleaning compositions comprising biosurfactants in a foam dispenser"

[0001] The present invention relates to a cleaning agent, in particular a cosmetic cleaning agent, the surfactant content of which is largely or only composed of biosurfactants, in combination with a foam dispenser.

[0002] Aqueous cosmetic cleaning agents typically contain surfactant mixtures, it being possible for anionic, amphoteric, non-ionic and cationic surfactants to be contained. Cleaning agents comprising these surfactants have a good cleaning power and in particular good foaming behavior. However, most of these surfactants are completely or partly obtained from petrochemicals. It is, however, becoming ever more important for cosmetic ingredients to be sustainable and this is increasingly demanded by consumers and manufacturers of cosmetic cleaning agents.

[0003] Biosurfactants are surface-active substances of microbial origin that can be produced using a substrate of plant oils or sugar. Some of these substrates can consist of agricultural waste such as rice husks or wastewater from the sugar industry, and so in this case no basic materials for food production are wasted. Biosurfactants thus satisfy the requirements of sustainability since they are produced from renewable resources. They are used in domestic cleaning agents, washing detergents and dishwasher detergents (e.g. US 5,520,839, DE 19600743 A1), as well as in various cosmetic cleaning agents (e.g. WO 2014/095367 A1, WO 2013/098066 A2).

[0004] WO 2014/095367 A1 discloses the use of biosurfactants in combination with anionic surfactants such as sodium lauryl ether sulfate. However, in this case at least 10 wt.%, in the examples up to 50 wt.%, of the surfactant content is still composed of anionic surfactants. Hitherto, the relatively poor foaming ability of biosurfactants has prevented them from being used as the entire surfactant content or as most of the entire surfactant content of cosmetic cleaning agents.

[0005] An object of the present invention was to provide cosmetic cleaning agents, the surfactant content of which is largely or only composed of surfactants produced from renewable resources, in an acceptable form for the consumer in terms of the foaming and washing behavior.

[0006] It has surprisingly been found that this can be achieved by using a cleaning agent of which 95 wt.% to 100 wt.% of the surfactant content is composed of biosurfactant(s), and by using said agent in combination with a foam dispenser for applying the cleaning agent. More particularly, a cosmetic cleaning agent can be used by which extremely satisfactory foaming behavior and washing behavior can be achieved for the consumer whilst being exceptionally pleasant to use, and sustainability and biodegradability requirements for the ingredients therein also being satisfied at the same time.

[0007] The present invention relates to:

1. A cleaning agent system comprising:
- a cleaning agent, 95 wt.% to 100 wt.% of the surfactant content of which is composed of biosurfactant(s), and
- a foam dispenser for applying the cleaning agent.

2. The cleaning agent system according to point 1, wherein the cleaning agent is provided as a concentrate separately from the foam dispenser.

3. The cleaning agent system according to point 1 or 2, wherein 99 wt.% to 100 wt.%, preferably 99.5 wt.% to 99.9 wt.%, of the surfactant content of the cleaning agent is composed of biosurfactant(s).

4. The cleaning agent system according to one of the preceding points,
which contains a glycolipid, a lipopeptide or a combination thereof as the biosurfactant.

5. The cleaning agent according to one of the preceding points,
which contains a rhamnolipid, a sophorolipid, a mannosylerythritol lipid, a surfactin, a fatty acyl glutamate, a fatty acyl glycinate or a combination thereof as the biosurfactant.

6. The cleaning agent according to point 5, which contains a sophorolipid as the biosurfactant, preferably a mixture of the acidic form and lactone form, wherein 20 to 60 wt.% is in the acidic form.

7. The cleaning agent according to point 5, which contains a rhamnolipid as the biosurfactant, preferably a mixture of mono- and dirhamnolipid, which are each derived from 3-hydroxydodecanoic acid and/or 3-hydroxyundecanoic acid.

8. The cleaning agent system according to one of the preceding points,
wherein the cleaning agent consists of water and the biosurfactant, wherein a preservative, a perfume or fragrance, a caring substance, a thickener or a combination thereof can optionally be contained.

9. The cleaning agent system according to one of the preceding points,
wherein the cleaning agent is formulated as a cosmetic cleaning agent, in particular as a cleaning agent for the face, body or hands, or as a concentrate thereof.

10. The cleaning agent system according to one of the preceding points,

wherein the cleaning agent contains only water as the carrier.

11. The cleaning agent system according to one of the preceding points,
wherein the cleaning agent or cleaning agent concentrate is provided in a bag, in particular a bag made of biodegradable material, and can be transferred into the foam dispenser in order to be used.

12. The cleaning agent system according to one of the preceding points,
wherein the foam dispenser is a foam pump.

13. The cleaning agent system according to point 11, wherein an F2 foam pump or a Cuisipro® foam pump is used as the foam pump.

14. The use of a cleaning agent or cleaning agent concentrate, which consists of water and a biosurfactant, wherein a preservative, a perfume or fragrance, a caring substance, a thickener or a combination thereof can optionally also be contained in the cleaning agent, as a cosmetic cleaning agent.

[0008] As one constituent, the cleaning agent system according to the invention comprises a cleaning agent, the surfactant content of which mainly consists of biosurfactants. More precisely, 95 to 100 wt.%, more preferably 97 to 100 wt.%, even more preferably 99 wt.% to 100 wt.%, also preferably 99.5 to 99.9 wt.%, of the surfactant content of the cleaning agent is composed of biosurfactant(s).

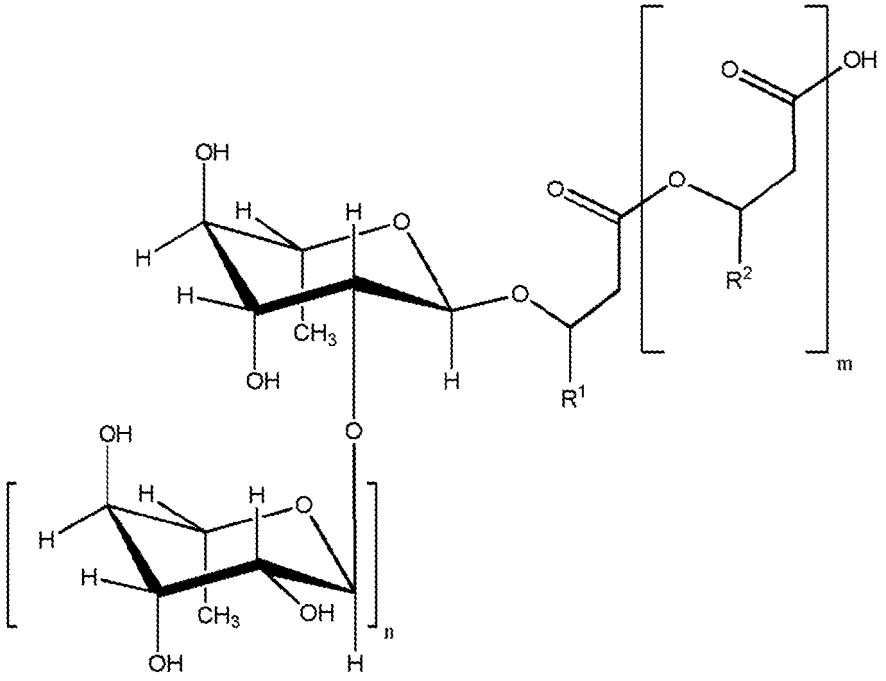
[0009] Biosurfactants are understood to be substances that are formed by microorganisms and are often expelled from the cell. Like classic surfactants, biosurfactants are surface-active substances that reduce the surface tension of liquids and thereby promote the mixing of aqueous (hydrophilic) and water-repellent (hydrophobic) phases. Biosurfactants can be produced under gentle production conditions that require little energy. They are generally highly biodegradable and are very environmentally friendly. Moreover, they are not toxic, nor are any toxic byproducts produced during the production thereof. Carbohydrates, in particular sugar, e.g. glucose, and/or lipophilic carbon sources such as fats, oils, partial glycerides, fatty acids, fatty alcohols, long-chain saturated or unsaturated hydrocarbons, are used as raw materials for the microbial production of the biosurfactants. According to the invention, the biosurfactants are preferably biosurfactants produced by fermentation.

[0010] Biosurfactants include glycolipids, lipopeptides, lipoproteins, fatty acids, phospholipids, neutral lipids and polymeric surfactants (e.g. emulsan), which can all also be used in the present invention.

[0011] Glycolipids that can be used in the present invention are compounds in which one or more monosaccharide units are glycosidically bonded to a lipid moiety. Examples of glycolipids as biosurfactants that can be used according to the invention are rhamnolipids, sophorolipids, mannosylerythritol lipids and trehalose lipids. Among these, rhamnolipids, sophorolipids, mannosylerythritol lipids and combinations thereof are preferred.

[0012] Rhamnolipids are obtained from bacteria of the genus Pseudomonas, in particular from Pseudomonas aeruginosa, preferably when grown on hydrophobic substrates such as n-alkanes or plant oils. Other glycolipids, for example glucose lipids, cellobiose lipids or trehalose lipids, are produced in turn by other microorganisms on different substrates. According to the invention, mannosylerythritol lipids are also preferred glycolipid biosurfactants; they are produced by Pseudozyma sp., Candida antarctica and Ustilago sp. bacteria.

[0013] According to the invention, rhamnolipids have the following general formula:



where m is 2, 1 or 0,
n is 1 or 0,
R^1 and R^2 are, independently of one another, the same or a different organic functional group having 2 to 24, preferably 5 to 13 carbon atoms, in particular a substituted or unsubstituted, branched or unbranched alkyl functional group, which can also be unsaturated, wherein the alkyl functional group is preferably a linear saturated alkyl functional group having 8 to 12 carbon atoms, more preferably is a nonyl or a decyl functional group or a mixture thereof.
Salts of these compounds are also included according to the invention.

[0014] In the present invention, the term "dirhamnolipid" is understood to mean compounds of the above formula or the salts thereof in which n is 1.

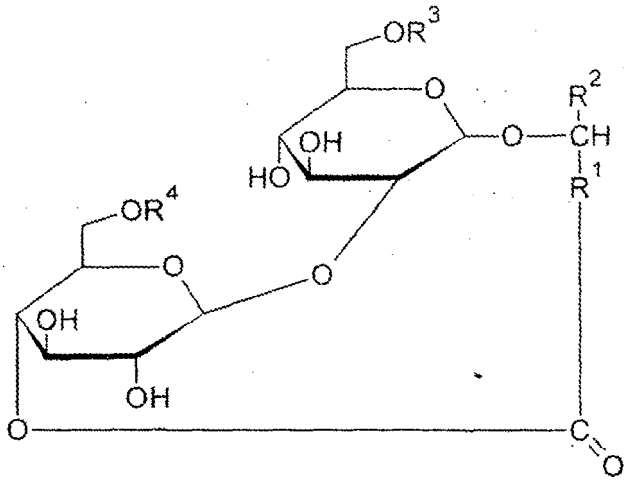
[0015] Accordingly, "monorhamnolipid" is understood in the present invention to mean compounds of the general formula or the salts thereof in which n is 0.

[0016] Mixtures of mono- and dirhamnolipids can preferably be used according to the invention. In this case, the ratio of monorhamnolipid to dirhamnolipid is preferably approximately 2:1 to 4:1, more preferably 2.5:1 to 3:1. Particularly preferred are those mixtures of mono- and dirhamnolipid in which, in the above formula, R^1 and R^2 independently represent a linear nonyl or decyl functional group. In the latter case, these are rhamnolipids that are each derived from 3-hydroxydodecanoic acid and/or 3-hydroxyundecanoic acid. Mixtures of this type can be obtained commercially under the name Rhamnolipid R90, R95 or R98 from Agae Technologies, USA, the number indicating the purity in each case. Rhamnolipid R90 can be used particularly preferably according to the invention.

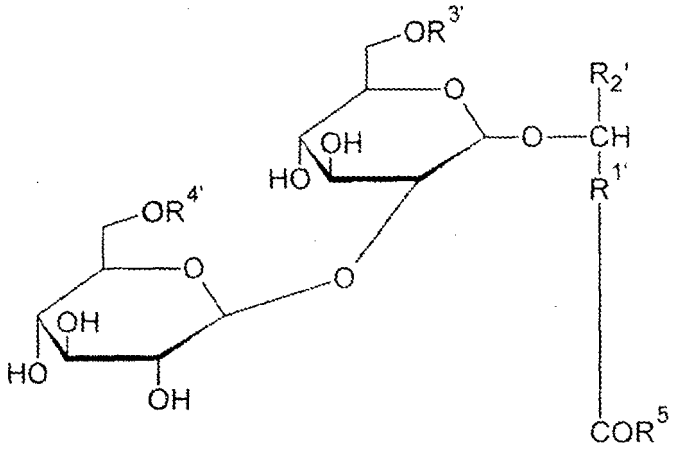
[0017] If stronger foaming properties are desired, a cleaning agent comprising rhamnolipids as the single or a substantial constituent of the biosurfactants is preferred according to the invention. Therefore, preferred cleaning agents in which the content of the rhamnolipids is 50 to 100 wt.% of the biosurfactant content are included in embodiments of the present invention.

[0018] Sophorolipids are produced by fermentation using yeasts such as Candida bombicola (also known as Torulopsis bombicola), Yarrowia lipolytica, Candida apicola (Torulopsis apicola) and Candida bogoriensis, by growing said yeasts on sugars, hydrocarbons, plant oils or mixtures thereof.

[0019] Sophorolipids have the following formulae (1) (lactone form) and (2) (free acid), the two forms typically being provided in a mixture.



(1)



(2)

where R^1 and $R^{1'}$ independently represent saturated hydrocarbon chains or single or multiple, in particular single, unsaturated hydrocarbon chains having 8 to 20, in particular 12 to 18 carbon atoms, more preferably 14 to 18 carbon atoms, which can be linear or branched and can comprise one or more hydroxy groups,

[0020] R^2 and $R^{2'}$ independently represent a hydrogen atom or a saturated alkyl functional group or a single or multiple, in particular single, unsaturated alkyl functional group having 1 to 9 carbon atoms, more preferably 1 to 4 carbon atoms, which can be linear or branched and can comprise one or more hydroxy groups, and

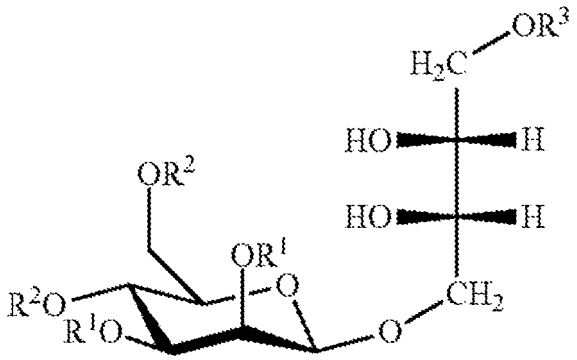
[0021] R^3, $R^{3'}$, R^4 and $R^{4'}$ independently represent a hydrogen atom or an acetyl group.

[0022] Sophorolipids in which R^1 and $R^{1'}$ are single, unsaturated, linear hydrocarbon chains having 15 carbon atoms are preferred. It is also preferred for R^2 and $R^{2'}$ to represent a methyl group or a hydrogen atom, even more preferably for each to represent a methyl group.

[0023] According to the invention, sophorolipids in which the acidic form and the lactone form are in a mixture are preferred, preferably approximately 20 to approximately 60 wt.% of the sophorolipids being in the acidic form and the remainder of the sophorolipids being in the lactone form.

[0024] In particular, sophorolipids are preferred in which compounds of the above formulae (1) and (2) are present in a mixture, where R^1 and $R^{1'}$ are a single, unsaturated, linear hydrocarbon chain having 14 to 18 carbon atoms, even more preferably 15 carbon atoms, R^3 and R^4 represent an acetyl group, $R^{3'}$ and $R^{4'}$ represent a hydrogen atom and R^2 and $R^{2'}$ represent a methyl group, and approximately 20 to 60 wt.% of the sophorolipids being in the acidic form.
Sophorolipids of this type can be obtained commercially, for example under the name Sopholiance S from Soliance. More precisely, the sophorolipid that can be obtained under the trade name Sopholiance S from Soliance is an approximately 60 wt.% sophorolipid solution and is, for example, obtained by fermenting Candida bombicola on rapeseed oil methyl ester and glucose (INCI: Candida bombicola/glucose/methyl rapeseed ferment (and) water). Sopholiance S is a preferred sophorolipid according to the invention.
In Sopholiance, approximately 20 wt.% is present in the free acid form, in a mixture with the lactone form.

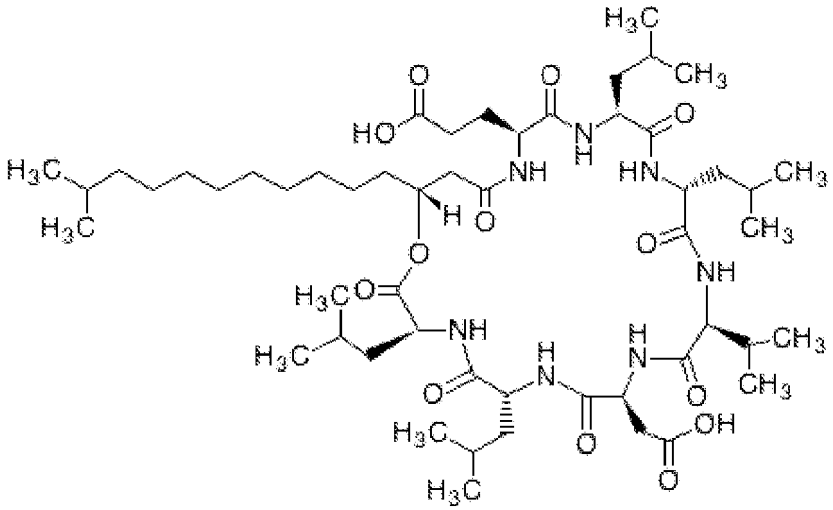
[0025] Mannosylerythritol lipids are glycolipids of the following general formula:



where R^1 independently represents fatty acid acyl groups having 4 to 24 carbon atoms, preferably 8 to 12 carbon atoms, R^2 independently represents a hydrogen atom or an acetyl group, and R^3 represents a hydrogen atom or a fatty acid acyl group having 2 to 24 carbon atoms. A mannosylerythritol lipid that is suitable according to the invention can be obtained commercially

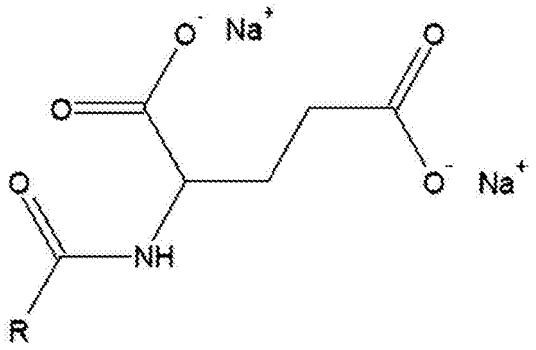
under the name Ceramela-B (Toyobo) (INCI: Pseudozyma tsukubaensis/olive oil/glycerin/soy protein ferment).

[0026] The lipids and lipid derivatives substance group, to which in particular lipopeptides belong, is also included in the biosurfactants. In general, lipopeptides are synthesized non-ribosomally by the respective microorganisms, for example by Gram-positive bacteria, in particular of the genera Bacillus and Streptomyces, by Gram-negative bacteria, in particular of the genus Pseudomonas and Myxobacteria, and by filamentous plants. Normally, the peptide chains consist of two to forty amino acids, and can be linear, cyclic or branched. Unlike ribosomally synthesized peptide chains, lipopeptides often not only comprise proteinogenic L-amino acids as the monomer structural element, but also D-amino acids and carboxylic acids and/or all types of alpha-hydroxy carboxylic acids. The amino acids are mostly L-α- or D-α-amino acids, although β-, γ- or δ-amino acids can also be present, which can likewise also be in a D- or L-configuration. The peptide chains can also comprise other chemical modifications; in particular they can be glycolyzed, hydrolyzed, N-methylated or N-formylated. Common structural elements are also thiazoline rings and/or oxazoline rings in various oxidation stages. A known lipopeptide biosurfactant is surfactin, which has the following structure and is generally used as an alkali salt or ammonium salt:



[0027] A surfactin that is suitable according to the invention can be obtained commercially from Kaneka.

[0028] The lipopeptides that can be preferably used as biosurfactants according to the invention also include fatty acyl glutamates. Said lipopeptides comprise the following general formula:



where R is a straight or branched alkyl chain having 5 to 21 carbon atoms, preferably 7 to 17 carbon atoms, more preferably 12 to 16 or 13 to 15 carbon atoms. Fatty acyl glutamates in the form of biosurfactants are generally provided in a mixture in which R has different chain lengths. The functional group R can also be hydroxylated, preferably by a single hydroxylation, in which case hydroxylation at β-position is preferred. Fatty acyl glutamates in the form of biosurfactants can, for example, be obtained from Modular Genetics, Inc., USA.

[0029] The lipopeptides that can preferably be used according to the invention as biosurfactants also include fatty acyl glycinates. These have the following general formula:

$$RC(O)NHCH_2CO_2X,$$

where

- R is a straight or branched alkyl chain having 5 to 21 carbon atoms, preferably 7 to 17 carbon atoms, more preferably 12 to 16 or 13 to 15 carbon atoms, and
- X is a cation, preferably an alkali metal cation or an ammonium cation, more preferably a sodium or ammonium cation, or -H.

Fatty acyl glycinates in the form of biosurfactants can also be present in a mixture in which R can comprise different chain lengths.

Fatty acyl glycinates in the form of biosurfactants can be obtained, for example, from Modular Genetics, Inc., USA.

[0030] According to the invention, cleaning agents that contain the following biosurfactants or biosurfactant combinations are preferred: rhamnolipid(s), rhamnolipid(s) + sophorolipid(s), rhamnolipid(s) + surfactin, rhamnolipid(s) + fatty acyl glutamate, rhamnolipid(s) + fatty acyl glycinate, rhamnolipid(s) + surfactin + sophorolipid(s), surfactin + sophorolipid(s), surfactin + fatty acyl glutamate, surfactin + fatty acyl glycinate.

It is particularly preferable in this case for the rhamnolipid content of the biosurfactants to be 10 to 90 wt.%, more preferably 20 to 80 wt.%, more preferably 30 to 70 wt.% or 40 to 60 wt.%, in particular approximately 50 wt.%. In other embodiments, it is preferred for the surfactin content of the biosurfactants to be 10 to 90 wt.%, more preferably 20 to 80 wt.%, more preferably 30 to 70 wt.% or 40 to 60 wt.%, in particular approximately 50 wt.%.

[0031] The cleaning agent of the cleaning agent system according to the invention is in particular a cosmetic cleaning agent.

[0032] The cleaning agent, more particularly the cosmetic cleaning agent, contains water as the carrier. Other common carriers such as ethanol and glycol can be included in embodiments of the invention, but in terms of biodegradability and natural availability of the raw materials, it is preferred for the cleaning agent to only contain water as the carrier.

[0033] According to the invention, the cosmetic cleaning agent can contain additional conventional ingredients of cosmetic cleaning agents. Examples of common ingredients of this kind are fragrances, preservatives, caring substances and/or thickeners. However, the present invention is not restricted to these additional ingredients.

[0034] However, according to the invention, the cosmetic cleaning agent can also be formulated such that it contains no other constituents besides the biosurfactant or a biosurfactant combination and water, and optionally a preservative and/or fragrance in typical amounts. In particular, owing to the combination with a foam dispenser, it is possible according to the invention for the cleaning agent to only consist of biosurfactants and water.

[0035] Preferably, organic acids or salts thereof, such as sodium benzoate, can be used as preservatives. If a preservative is contained, it is preferably contained in an amount of 0 to 2 wt.%, preferably 0.05 to 1.5 wt.%, more preferably 0.1 to 1 wt.%, and most preferably 0.2 to 0.6 wt.%, in each case based on the total weight of the cleaning agent.

[0036] According to the invention, natural fragrances are preferred in particular as fragrances that can be contained in the cosmetic cleaning agent. If a fragrance is contained, it is preferably contained in an amount of 0 to 2 wt.%, preferably 0.05 to 1.5 wt.%, more preferably 0.1 to 1 wt.%, and most preferably 0.2 to 0.6 wt.%, in each case based on the total weight of the cleaning agent.

[0037] As a caring substance, the agent can, for example, contain oil components, preferably natural oil components such as plant oils and plant extracts, but also monosaccharides or oligosaccharides and/or lipids. Aloe vera extracts or olive oil are mentioned as examples. If a caring substance is contained, it is preferably contained in an amount of 0.1 to 10 wt.%, preferably 0.5 to 7 wt.%, more preferably 1 to 5 wt.%, in each case based on the total weight of the cleaning agent.

[0038] As thickeners, according to the invention, thickeners of plant origin are preferably contained, such as polysaccharides like celluloses (cellulose itself and derivatives thereof), alginic

acids (and the corresponding physiologically acceptable salts thereof, the alginates), agar agar (with the polysaccharide agarose present as the main constituent in agar agar), starch fractions and derivatives such as amylose, amylopectin and dextrin, karaya gum, gellan gum, carob flour, gum arabic, dextrane, guar gum and xanthan gum or combinations thereof. Synthetic thickeners, such as polyacrylates, are preferably not contained.

[0039] Suitable cellulose derivatives are methyl celluloses, ethyl celluloses, hydroxyalkyl celluloses (such as hydroxyethyl cellulose), methyl hydroxyalkyl celluloses and carboxy methyl celluloses (INCI: cellulose gum) and the physiologically acceptable salts thereof.

[0040] If a thickener is contained, it is preferably contained in an amount of 0.01 to 30 wt.%, preferably 0.05 to 20 wt.%, more preferably 0.1 to 10 wt.%, in each case based on the total weight of the cleaning agent.

[0041] The above measurements for the preservatives, fragrances, caring substances and thickeners are each based on the concentrations when applying the cleaning agent. In the case of concentrates, the amounts may be accordingly higher.

[0042] The cleaning agent, more particularly a cosmetic cleaning agent, contains the biosurfactants in an amount of approximately 1 to 50 wt.%, preferably approximately 1 to 30 wt.%, more preferably approximately 2 to 20 wt.%, more preferably 2 to 15 wt.%, based on the total weight of the cleaning agent, the concentrations here being those when applying the cleaning agent.

[0043] The present invention relates to a cleaning agent system. In the process, the cleaning agent is provided in combination with a foam dispenser. According to the invention, the cleaning agent can be present in the foam dispenser in the form suitable for application. It is also possible according to the invention for the cleaning agent system to be designed such that the cleaning agent is initially marketed separately from the foam dispenser, for example in a plastics bag, and is only transferred into the foam dispenser by the user. In this case, the plastics bag is preferably made of a biodegradable material, for example a starch-based material. In particular if the cleaning agent is initially separate from the foam dispenser, it is preferable for the cleaning agent, which is initially provided separately, to be designed as a concentrate. The concentrate can be transferred into the foam dispenser at the user's premises and diluted with water. This embodiment in particular reduces transportation costs.

[0044] A concentrate diluted with water in the ratio of cleaning agent to water of approximately 1:2 to 1:4, preferably approximately 1:3 is preferred. Normal tap water or distilled water can be used for dilution.

[0045] According to the invention, a foam dispenser is understood to be a device having a container and a closure and by which liquid cosmetic cleaning agents, which are generally not foamed in the container, can be applied such that they foam upon exiting the closure. In particular, foam dispensers in which no propellant is needed to create the foam are included according to the invention. Accordingly, the cleaning agents in the present invention or the cleaning agent system preferably do(es) not contain any propellant. The design of the closure is thus substantially responsible for the creation of foam. Foam dispensers of this type are known. According to the invention, a foam pump is preferably used as a foam dispenser. Foam pumps can be obtained commercially. It has been shown that, according to the invention, the use of an F2 foam pump or a Cuisipro® foam pump delivers particularly good foaming results.

[0046] According to the invention, the cosmetic cleaning agent can be provided as a shampoo, shower gel, liquid hand soap, face cleaning agent, facial gel or other known cosmetic forms, or as a concentrate of each of these.

[0047] Overview in tables:

[0048] Preferred cosmetic cleaning agents for the cleaning agent system according to the invention are set out below. All the information is given in wt.% and relates to the active ingredient concentration.

	Formula 1	Formula 2	Formula 3	Formula 4
Rhamnolipid	1 to 50	1 to 30	2 to 20	2 to 15
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 1a	Formula 2a	Formula 3a	Formula 4a
Rhamnolipid	1 to 50	1 to 30	2 to 20	2 to 15
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 1b	Formula 2b	Formula 3b	Formula 4c
Rhamnolipid	1 to 50	1 to 30	2 to 20	2 to 15
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 1c	Formula 2c	Formula 3c	Formula 4c
Rhamnolipid	1 to 50	1 to 30	2 to 20	2 to 15

Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 5	Formula 6	Formula 7	Formula 8
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 5a	Formula 6a	Formula 7a	Formula 8a
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 5b	Formula 6b	Formula 7b	Formula 8b
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 5c	Formula 6c	Formula 7c	Formula 8c
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 9	Formula 10	Formula 11	Formula 12
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glutamate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 9a	Formula 10a	Formula 11a	Formula 12a

Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glutamate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 9b	Formula 10b	Formula 11b	Formula 12b
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glutamate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 9c	Formula 10c	Formula 11c	Formula 12c
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glutamate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 13	Formula 14	Formula 15	Formula 16
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glycinate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 13a	Formula 14a	Formula 15a	Formula 16a
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glycinate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 13b	Formula 14b	Formula 15b	Formula 16b
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glycinate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10

Misc	total to 100	total to 100	total to 100	total to 100

	Formula 13c	Formula 14c	Formula 15c	Formula 16c
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glycinate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 17	Formula 18	Formula 19	Formula 20
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Sophorolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 17a	Formula 18a	Formula 19a	Formula 20a
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Sophorolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 17b	Formula 18b	Formula 19b	Formula 20b
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Sophorolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 17c	Formula 18c	Formula 19c	Formula 20c
Rhamnolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Sophorolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 21	Formula 22	Formula 23	Formula 24
Rhamnolipid	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Sophorolipid	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Surfactin	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 21a	Formula 22a	Formula 23a	Formula 24a
Rhamnolipid	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Sophorolipid	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Surfactin	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 21b	Formula 22b	Formula 23b	Formula 24b
Rhamnolipid	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Sophorolipid	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Surfactin	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 21c	Formula 22c	Formula 23c	Formula 24c
Rhamnolipid	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Sophorolipid	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Surfactin	0.5 to 20	0.5 to 10	1 to 7.5	1 to 5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 25	Formula 26	Formula 27	Formula 28
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Sophorolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula	Formula	Formula	Formula

	25a	26a	27a	28a
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Sophorolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 25b	Formula 26b	Formula 27b	Formula 28b
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Sophorolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 25c	Formula 26c	Formula 27c	Formula 28c
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Sophorolipid	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 29	Formula 30	Formula 31	Formula 32
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glutamate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 29a	Formula 30a	Formula 31a	Formula 32a
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glutamate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 29b	Formula 30b	Formula 31b	Formula 32b
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glutamate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5

Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

	Formula 29c	Formula 30c	Formula 31c	Formula 32c
Surfactin	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Fatty acyl glutamate	0.5 to 25	0.5 to 15	1 to 10	1 to 7.5
Caring substance	0.1 to 10	0.1 to 7	0.5 to 5	1 to 5
Thickener	0.01 to 30	0.05 to 20	0.1 to 15	0.1 to 10
Misc	total to 100	total to 100	total to 100	total to 100

[0049] Notes:
According to the invention, "Misc" is substantially understood to be water, optionally in combination with another cosmetic carrier, although the cosmetic carrier preferably only comprises water. "Misc" can optionally include a preservative and/or a fragrance.
Caring substance: preferably plant oils and/or extracts such as olive oil or aloe vera extract.
Thickener: preferably plant thickeners such as xanthan gum, guar gum.

[0050] Examples

[0051] The following cleaning agents set out in the tables were produced. The percentages are to be understood as percent by weight, based in each case on the total weight of the cleaning agent.

Table 1

INCI or other name	**Example 1** Mild face cleanser	**Example 2** Face cleanser concentrate	**Example 3** Liquid hand soap 3:1 concentrate	**Example 4** Mild face cleanser	**Example 5** Face cleanser 3:1 concentrate
Rhamnolipid R-90	2	6	30	1	3
Surfactin	-	-	-	1	3
Na benzoate	0.20	1	-	0.20	0.60
Natural fragrance	-	0.20	0.60	0.10	0.30
Water	to 100	to 100	to 100	to 100	to 100.00
	100.00	100.00	100.00	100.00	100.00

Table 2

INCI or other name	**Example 6** Mild face cleanser	**Example 7** Face cleanser	**Example 8** Liquid hand soap	**Example 9** Mild face cleanser	**Example 10** Face cleanser 3:1 concentrate

		concentrate	3:1 concentrate		
Rhamnolipid R-90	1	3	15	1	3
Acyl glutamate	1	3	15	-	-
Sophorolipid Soliance S	-	-	-	1	3
Na benzoate	0.20	-	-	0.20	0.60
Natural fragrance	-	0.20	0.60	0.10	0.30
Aloe vera extract	0.10	30	-	-	-
Water	to 100	to 100	to 100	to 100	to 100.00
	100.00	100.00	100.00	100.00	100.00

Table 3

INCI or other name	**Example 11** Mild face cleanser	**Example 12** Face cleanser concentrate	**Example 13** Liquid hand soap 3:1 concentrate	**Example 14** Mild face cleanser	**Example 15** Face cleanser 3:1 concentrate
Rhamnolipid R-90	1	3	15	1	3
Surfactin	1	3	15	1	3
Sophorolipid Soliance S	-	-	-	1	3
Na benzoate	0.20	-	-	0.20	-
Natural fragrance	-	0.20	0.60	0.10	0.30
Aloe vera extract	0.10	30	-	-	-
Water	to 100	to 100	to 100	to 100	to 100.00
	100.00	100.00	100.00	100.00	100.00

Table 4

INCI or other name	**Example 16** Mild face cleanser	**Example 17** Face cleanser concentrate	**Example 18** Liquid hand soap 3:1 concentrate	**Example 19** Mild face cleanser	**Example 20** Face cleanser 3:1 concentrate
Surfactin	1	3	20	1	3
Sophorolipid Soliance S	1	3	20	1	3
Na benzoate	0.20	-	-	0.20	-
Natural fragrance	-	0.20	0.60	0.10	0.30
Olive oil KBA	-	-	-	-	3
Water	to 100	to 100	to 100	to 100	to 100.00
	100.00	100.00	100.00	100.00	100.00

Table 5

INCI or other name	**Example 21** Mild face cleanser	**Example 22** Face cleanser concentrate	**Example 23** Liquid hand soap 3:1 concentrate	**Example 24** Mild face cleanser	**Example 25** Face cleanser 3:1 concentrate
Surfactin	1	3	15	1	3
Acyl glutamate	1	3	15	1	3
Na benzoate	0.20	-	-	0.20	-
Natural fragrance	-	0.20	0.60	0.10	0.30
Guar gum	0.10	-	-	-	50
Water	to 100	to 100	to 100	to 100	to 100.00
	100.00	100.00	100.00	100.00	100.00

Table 6

INCI or other name	**Example 26** Mild face cleanser	**Example 27** Face cleanser concentrate	**Example 28** Liquid hand soap 3:1 concentrate	**Example 29** Mild face cleanser	**Example 30** Face cleanser 3:1 concentrate
Rhamnolipid R-90	1	3	15	1	3
Acyl glycinate	1	3	15	-	-
Sophorolipid Soliance S	-	-	-	1	3
Na benzoate	0.20	-	-	0.20	0.60
Natural fragrance	-	0.20	0.60	0.10	0.30
Aloe vera extract	0.10	30	-	-	-
Water	to 100	to 100	to 100	to 100	to 100.00
	100.00	100.00	100.00	100.00	100.00

[0052] All the compositions in examples 1 to 25 were transferred into an F2 foam pump, applied by means of this foam pump, and subjected to an arm washing test, in which the feel during application, the foaming properties and the washing action were assessed. Each concentrate was diluted to the ratio 3 parts water to 1 part concentrate in the foam dispenser.

[0053] An excellent combination of these properties was consistently observed. In particular, the foaming behavior upon application by means of the foam dispenser was extremely satisfactory in all cases. Owing to the antibacterial action of the biosurfactants, it was also possible in particular to provide compositions with no preservatives.

Claims

1. A cleaning agent system comprising:
- a cleaning agent, 95 wt.% to 100 wt.% of the surfactant content of which is composed of biosurfactant(s), and
- a foam dispenser for applying the cleaning agent.

2. The cleaning agent system according to claim 1, wherein the cleaning agent is provided as a concentrate separately from the foam dispenser.

3. The cleaning agent system according to claim 1 or 2, wherein 99 wt.% to 100 wt.%, preferably 99.5 wt.% to 99.9 wt.%, of the surfactant content of the cleaning agent is composed of biosurfactant(s).

4. The cleaning agent system according to one of the preceding claims, which contains a glycolipid, a lipopeptide or a combination thereof as the biosurfactant.

5. The cleaning agent according to one of the preceding claims,which contains a rhamnolipid, a sophorolipid, a mannosylerythritol lipid, a surfactin, a fatty acyl glutamate, a fatty acyl glycinate or a combination thereof as the biosurfactant.

6. The cleaning agent according to claim 5, which contains a sophorolipid as the biosurfactant, preferably a mixture of the acidic form and lactone form, wherein 20 to 60 wt.% is in the acidic form.

7. The cleaning agent according to claim 5, which contains a rhamnolipid as the biosurfactant, preferably a mixture of mono- and dirhamnolipid, which are each derived from 3-hydroxydodecanoic acid and/or 3-hydroxyundecanoic acid.

8. The cleaning agent system according to one of the preceding claims, wherein the cleaning agent consists of water and the biosurfactant, wherein a preservative, a perfume or fragrance, a caring substance, a thickener or a combination thereof can optionally be contained.

9. The cleaning agent system according to one of the preceding claims, wherein the cleaning agent is formulated as a cosmetic cleaning agent, in particular as a cleaning agent for the face, body or hands, or as a concentrate thereof.

10. The cleaning agent system according to one of the preceding claims, wherein the cleaning agent contains only water as the carrier.

11. The cleaning agent system according to one of the preceding claims, wherein the cleaning agent or cleaning agent concentrate is provided in a bag and can be transferred into the foam dispenser in order to be used.

12. The cleaning agent system according to one of the preceding claims, wherein the foam dispenser is a foam pump.

13. The cleaning agent system according to claim 11, wherein an F2 foam pump or a Cuisipro® foam pump is used as the foam pump.

14. The use of a cleaning agent or cleaning agent concentrate, which consists of water and a biosurfactant, wherein a preservative, a perfume or fragrance, a caring substance, a thickener or a combination thereof can optionally also be contained in the cleaning agent, as a cosmetic cleaning agent.

Intellectual Property Office

Application No:	GB1615503.8	**Examiner:**	Dr Sarah Narramore
Claims searched:	1-13	**Date of search:**	7 June 2017

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-5 and 8-13	EP1808154 A2 (LOGOCOS COSMETIK HERSTELLUNGS) See in particular the examples and WPI abstract (accession number 2007-692508).
X	1-5 and 8-13	EP2740467 A1 (OTC GMBH) See in particular example 1 and paragraph [0033].
X	1-5 and 8-13	DE102014223166 A1 (BEIERSDORF AG) See in particular WPI abstract (accession number 2016-293864) and examples C and F.
X	1-13	WO2011/120776 A1 (UNILEVER PLC) See in particular the abstract and tables 3 and 4.
X	1-13	US2014/349902 A1 (ALLEF) See in particular table 83.
X	1-5 and 7-13	US2014/296168 A1 (SCHILLING) See in particular paragraph [0010] and example 5.
X	1-5 and 8-13	WO2014/029711 A2 (UNILEVER PLC) See in particular page 1 line 28 to page 2 line 3 and table 1.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

A47K; A61K; A61Q

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
A61K	0008/04	01/01/2006
A47K	0005/14	01/01/2006
A61K	0008/60	01/01/2006
A61K	0008/64	01/01/2006
A61Q	0019/10	01/01/2006