(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 May 2019 (23.05.2019)

WIPO | PCT

(10) International Publication Number
WO 2019/096635 A1

(51) International Patent Classification:
A61K 8/34 (2006.01) *A61Q 19/00* (2006.01)
A61K 8/37 (2006.01) *A61P 17/10* (2006.01)
A61Q 17/00 (2006.01)

(21) International Application Number:
PCT/EP2018/080386

(22) International Filing Date:
07 November 2018 (07.11.2018)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
17202147.9 16 November 2017 (16.11.2017) EP

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

WO 2019/096635 A1

(54) Title: TOPICAL COMPOSITIONS

(57) Abstract: The present invention relates to topical compositions comprising phytantriol and glyceryl caprylate, characterized in that the composition is free of phenoxyethanol as well as to the use of phytantriol in combination with glyceryl caprylate for the prevention and/or treatment of ailments associated with Propionibacterium acnes.

Topical compositions

The present invention relates to topical compositions comprising phytantriol and glyceryl caprylate, characterized in that the composition is free of phenoxyethanol as well as to the use of phytantriol in combination with glyceryl caprylate for the prevention and/or treatment of ailments associated with Propionibacterium acnes and to prevent microbial decay of cosmetic products.

To protect cosmetic compositions, household products, plastics, paper and/ or paints against mold and bacteria, most products currently on the market contain preservatives. While these preservatives protect against bacteria and fungi, studies have linked daily exposure to many of these substances to an increased risk of skin irritation, cancer and/ or endocrine problems. Thus, many manufactures are searching for alternative antimicrobial actives which allow reducing the amount of preservatives and don't appear to pose any health risks.

Antimicrobial active compounds furthermore play a key role for many cosmetic applications:

Acne is taken to mean a skin disorder which is evident in inflamed papules, pustules or nodules, caused by increased talc production and impaired keratinization of the skin. The inflammation may be associated with reddening, swelling and pressure pain. Besides genetic predisposition, possible causes of acne formation can be androgens, comedogenic substances (for example in cosmetics), smoking, stress or excessive colonization of the skin by bacteria. Acne is in particular triggered by the microorganism Propionibacterium acnes (P. acnes), which is a bacterium which usually colonizes the skin and lives on sebum. Acne may arise, for example, if the number of these bacteria is increased. The presence of bacteria in the follicles results in inflammation reactions, which is evident in the form of red nodules or pustules. The production of free fatty acids by the bacteria furthermore promotes the inflammation reaction in the follicle. While many approaches to acne treatment have been reported, some have advocated use of a systemic or topical agent to address the overgrowth of Propionibacterium acnes.

Today, systemic therapy of acne often requires prescription antibiotics, such as erythromycin, tetracyclines, and clindamycin. In recent times however, physicians have become reluctant to over-prescribe antibiotics because resistance may be developed by not only acne-causing bacteria but other bacteria which are the causative agents of other more serious diseases. Furthermore, systemic administration may cause systemic side effects, as relatively high levels of the drug must circulate throughout the entire body.

Topical antibiotics which have been utilized to attempt to inhibit the overgrowth of P. acnes are clindamycin, erythromycin, tetracycline, and metronidazole. Each of these topical antibiotics reportedly cause side effects and widespread use also contributes to the risk of bacterial resistance.

Thus, there is an ongoing need for non-antibiotic alternatives, which can help to control the growth of P. acnes on the skin and are thus suitable for the treatment and are thus suitable for the treatment of any ailments associated with an overpopulation of P. acnes on the skin.

Phenoxyethanol is used as an anti-bacterial in cosmetics but can have significant adverse effects. Thus, there is an ongoing need to replace phenoxyethanol for the treatment of acne with other well accepted cosmetic ingredients.

Surprisingly it has now been found that the combination of phytantriol and glyceryl caprylate shows a synergistic antimicrobial effect against P. acnes. Thus, the combination can effectively be used in cosmetic compositions which are free of any phenoxyethanol to control the P. acnes on the skin and/ or the scalp and thus overcome the adverse effects resulting from a P. acnes overpopulation on the skin and/ or scalp such the treatment of inflammation triggered by P. acnes, red nodules or pustules.

Furthermore, the combined use of phytantriol and glyceryl caprylate, optionally in combination with propanediol has been shown to be efficient to improve preservation of cosmetic products.

Thus, in a first embodiment the present invention relates to topical compositions comprising phytantriol and glyceryl caprylate with the proviso that the composition does not contain any phenoxyethanol.

In another embodiment, the invention relates to a combination of phytantriol and glyceryl caprylate as antimicrobial agent against P. acnes.

In a further embodiment, the invention relates to a method for killing and/ or inhibiting P. acnes, said method comprising contacting P. acnes with a combination of phytantriol and glyceryl caprylate.

Due to the antimicrobial activity against P. acnes the combination of phytantriol and glyceryl caprylate is further suitable for the treatment of any adverse skin condition associated with an overpopulation of P. acnes by maintaining a healthy skin homeostasis and/ or improving the health of the skin microbiome.

Thus, the invention also relates to a method of treating the skin and/ or the scalp, said method comprising the steps of contacting the skin and/ or scalp with a topical composition according to the present invention for the treatment, prevention and/or prophylaxis of acne as well as for maintaining a healthy skin homeostasis and/ or skin microbiome balance.

In a further embodiment, the present invention relates to the use of a topical composition according to the present invention for the treatment, prevention and/or prophylaxis of acne as well as for maintaining skin homeostasis and/ or skin microbiome balance.

Phytantriol [CAS: 74563-64-7] is a colourless to light yellow, viscous liquid with the chemical name 3,7,11,15-tetramethyl-hexadecane-1,2,3-triol. Phytantriol is e.g. commercially available at DSM Nutritional Products Ltd, Kaiseraugst.

Glyceryl caprylate [26402-26-6] is e.g. commercially available as Dermosoft GMCY at Dr. Straetmann.

The term "antimicrobial activity" (or "antimicrobial effect") as used herein means a capability of killing and/or inhibiting the growth of microbial cells such as in particular P. acnes.

In all embodiments of the present invention the topical compositions preferably comprise phytantriol in an amount selected in the range of about 0.005 to 5 wt.-%,

more preferably in the range of about 0.01 to 3 wt.-% and most preferably in the range of 0.025 to 2 wt.-%, such as in an amount of 0.04 to 1.5 wt.-% and particularly advantageous in an amount of 0.04 to 1 wt.-%, based on the total weight of the composition.

In all embodiments of the present invention the topical compositions preferably comprise the glyceryl caprylate in an amount selected in the range of about 0.01 to about 2 wt.-%, preferably in the range of 0.05 to 1.5 wt.-%, most preferably in the range of 0.1 to 1 wt.-%, based on the total weight of the composition.

The ratio (w/w) of phytantriol to glyceryl caprylate in all embodiments of the present invention is preferably selected in the range of 5:1 to 1:5, such as in the range of 2.5:1 to 1:2.5, such as most preferable in the range of about 1:1.

To make use of the anti-microbial activity of the combination of phytantriol and glyceryl caprylate, it can be used in a multiplicity of formulations or applications, such as, for example, topical compositions, medicinal products or household products, also for preservation purposes.

Thus, in another embodiment, the invention relates to a method of preventing microbial decay and breakdown of topical compositions according to the present invention, wherein said method comprises adding to the compositions phytantriol in combination with glyceryl caprylate, even more preferably further in combination with propanediol as an antimicrobial agent. In a particular embodiment, the method also encompasses the step of appreciating the result.

In a further embodiment, the invention also relates to a method of preserving the topical composition according to the present invention against microbiological contamination or growth, wherein said method comprises adding to the compositions, phytantriol in combination with glyceryl caprylate, even more preferably further in combination with propanediol. In a particular embodiment, the method also encompasses the step of appreciating the result.

It is well understood that in the methods to prevent microbial decay and breakdown of the topical compositions no phenoxyethanol is used.

It is furthermore particularly preferred that in the methods to prevent microbial decay and breakdown of the topical compositions no isopropylparabene is used.

Most preferably, in all embodiments of the present invention, next to being isopropylparabene and/ or phenoxyethanol free, the compositions also advantageously do not contain isobutylparaben, phenylparaben, benzylparaben and/ or pentylparaben. Most preferably in all embodiments of the present invention, the compositions contain no parabenes at all, i.e. no methylparaben, ethylparaben, isopropylparabene, isobutylparaben, phenylparaben, benzylparaben and pentylparaben.

Thus, in a further advantageous embodiment, the present invention relates to method for preserving a topical composition according to the present invention, wherein the formulation is free of isopropylparabene, preferably of any parabenes, said method comprising incorporating into the composition phytantriol and glyceryl caprylate, even more preferably in combination with propanediol. In a particular embodiment, the method also encompasses the step of appreciating the result.

In a particular advantageous embodiment, the invention relates to a method of preventing microbial decay and breakdown of topical compositions as outlined herein which compositions furthermore comprise water and at least one further agent selected from the group consisting of surfactants, emulsifiers, thickeners, and oils as such compositions are particular sensitive to microbial growth.

In the methods of preventing microbial decay and breakdown or preserving a topical composition against microbiological contamination or growth, it is preferred that the compositions do not exhibit a microbial contamination exceeding the initial contamination rate with at least one microorganism in a period of at least 7 days, more preferably of at least 14 days, most preferably of at least 28 days, (assessed according ISO 11930). Even more preferably, the number (i.e. Colony Forming Unit, CFU) of at least one bacteria or mold, such as in particular Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli and/ or Candida albicans is significantly reduced.

Propanediol [CAS: 504-63-2] is e.g. commercially available as ZEMEA from DuPont Tate & Lyle Bio Products Company, LLC.

In all embodiments of the present invention the topical compositions preferably comprise the propanediol in an amount selected in the range of about 0.01 to about 10 wt.-%, preferably in the range of 0.5 to 7.5 wt.-%, most preferably in the range of 1 to 5 wt.-%, based on the total weight of the composition.

It is furthermore preferred that the amount of propanediol used in the compositions is higher than the sum of the amounts of phytantriol and glyceryl caprylate, preferably at least two times higher, more preferably at least 3 times higher.

The use according to the invention of the combination of phytantriol and glyceryl caprylate and optionally propanediol can take place both in the cosmetic sense as well as in the pharmaceutical sense. A pharmaceutical application is conceivable, for example, in the case of specific anti-acne compositions. In all embodiments of the present invention, the use is however preferably cosmetic (non-therapeutic) such as for maintenance of skin homeostasis and/ or balancing the skin microbiome.

The topical compositions according to the present invention are preferably cosmetic or pharmaceutical compositions which are topically applied to mammalian keratinous tissue such as in particular to human skin or the human scalp and hair.

The term "cosmetic composition" as used in the present application refers to cosmetic compositions as defined under the heading "Kosmetika" in Römpp Lexikon Chemie, 10th edition 1997, Georg Thieme Verlag Stuttgart, New York as well as to cosmetic compositions as disclosed in A. Domsch, "Cosmetic Compositions", Verlag für chemische Industrie (ed. H. Ziolkowsky), 4th edition, 1992.

The cosmetic or pharmaceutical compositions according to the present invention preferably further comprise a physiologically acceptable medium, that is to say a medium compatible with keratinous substances, such as the skin, mucosa, and keratinous fibers. Preferably, the physiologically acceptable medium is a cosmetically or pharmaceutically acceptable carrier.

The term cosmetically or pharmaceutically acceptable carrier refers to all carriers and/or excipients and/ or diluents conventionally used in cosmetic compositions.

The topical compositions according to the present invention are generally prepared by admixing phytantriol and glyceryl caprylate in the amounts indicated herein with a suitable carrier.

The exact amount of carrier will depend upon the actual level of phytantriol and glyceryl caprylate and any other optional ingredients that one of ordinary skill in the art would classify as distinct from the carrier (e.g., other active ingredients).
In an advantageous embodiment, the cosmetic or pharmaceutical compositions according to the present invention comprise from about 50% to about 99%, preferably from about 60% to about 98%, more preferably from about 70% to about 98%, such as in particular from about 80% to about 95% of a carrier, based on the total weight of the cosmetic composition.

In a particular advantageous embodiment, the carrier consists furthermore of at least 40 wt.-%, more preferably of at least 50 wt.-%, most preferably of at least 55 wt.-% of water, such as in particular of about 55 to about 90 wt.-% of water.

The compositions of the invention (including the carrier) may comprise conventional adjuvants and additives, such as preservatives/antioxidants, fatty substances/oils, organic solvents, silicones, thickeners, softeners, emulsifiers, antifoaming agents, aesthetic components such as fragrances, surfactants, fillers, anionic, cationic, nonionic or amphoteric polymers or mixtures thereof, propellants, acidifying or basifying agents, dyes, colorings/colorants, abrasives, absorbents, chelating agents and/ or sequestering agents, essential oils, skin sensates, astringents, pigments or any other ingredients usually formulated into such compositions.

In accordance with the present invention, the compositions according to the invention may also comprise further cosmetically active ingredients conventionally used in cosmetic or pharmaceutical compositions. Exemplary active ingredients encompass skin lightening agents; UV-filters, agents for the treatment of hyperpigmentation; agents for the prevention or reduction of inflammation; firming, moisturizing, soothing, and/ or energizing agents as well as agents to improve elasticity and skin barrier.

Examples of cosmetic excipients, diluents, adjuvants, additives as well as active ingredients commonly used in the skin care industry which are suitable for use in the cosmetic compositions of the present invention are for example described in the International Cosmetic Ingredient Dictionary & Handbook by Personal Care Product

Council (http://www.personalcarecouncil.org/), accessible by the online INFO BASE (http://online.personalcarecouncil.org/jsp/Home.jsp), without being limited thereto.

The necessary amounts of the active ingredients as well as the excipients, diluents, adjuvants, additives etc. can, based on the desired product form and application, easily be determined by the skilled person. The additional ingredients can either be added to the oily phase, the aqueous phase or separately as deemed appropriate.

The cosmetically active ingredients useful herein can in some instances provide more than one benefit or operate via more than one mode of action.

Of course, one skilled in this art will take care to select the above mentioned optional additional ingredients, adjuvants, diluents and additives and/or their amounts such that the advantageous properties intrinsically associated with the combination in accordance with the invention are not, or not substantially, detrimentally affected by the envisaged addition or additions.

Preferably, the cosmetic or pharmaceutical compositions according to the invention are in the form of a suspension or dispersion in solvents or fatty substances, or alternatively in the form of an emulsion or micro emulsion (in particular of O/W- or W/O-type), PIT-emulsion, nano emulsion, multiple emulsion (e. g. O/W/O- or W/O/W-type), pickering emulsion, hydrogel, lipogel, one- or multiphase solution or vesicular dispersion.

The cosmetic or pharmaceutical compositions in accordance with the invention can be in the form of a liquid, lotion, a thickened lotion, a gel, a cream, a milk, an ointment or a paste.

The cosmetic or pharmaceutical compositions according to the invention have a pH in the range of 3-10, preferably in the range of pH of 3-8, most preferred in the range of pH 3-7.5. The pH is adjusted by methods known to a person skilled in the art, e.g. by using an acid such as a hydroxy acid including glycolic acid, lactic acid, malic acid, citric acid and tartaric acid or a base such as e.g. sodium or potassium hydroxide or ammonium hydroxide as well as mixtures thereof.

Preferably, in the compositions according to the invention the acid, if present, is used in an amount of at least 0.0001 wt.-%, such as e.g. in an amount of 0.01-1 wt.-%, in particular in an amount of 0.01 to 0.5 wt.-%.

The cosmetic compositions according to the present invention advantageously comprise an additional preservative. Particular suitable preservatives in all embodiments of the present invention are benzoic acid, sodium benzoate, sorbic acid, potasssium sorbate, dehydroacetic acid, alcohol, alcohol denat.; as well as mixtures thereof. When present, the preservative is preferably used in an amount of 0.01 to 2 wt.-%, more preferably in an amount of 0.05 to 1.5 wt.-%, most preferably in an amount of 0.1 to 1.0 wt.-%, based on the total weight of the composition.

In another preferred embodiment, the compositions according to the present invention may comprise an additional amount of a preservation booster such as hydroxyacetophenone, caprylyl glycol, pentylene glycol, 1,2 hexanediol, decylene glycol, monoglycerides such as glyceryl laurate, propylene glycol caprylate, propylene glycol heptanoate as well as mixtures thereof.

When present, the preservation booster is preferably used in an amount of 0.01 to 2 wt.-%, more preferably in an amount of 0.05 to 1.5 wt.-%, most preferably in an amount of 0.1 to 1.0 wt.-%, based on the total weight of the composition.

The cosmetic compositions according to the present invention are in particular skin care preparations, functional preparations and/ or hair care preparations such as most in particularly skin or hair care preparations.

Examples of skin care preparations are, in particular, light protective preparations (sunscreen preparations), anti-ageing preparations, preparations for the treatment of photo-ageing, body oils, body lotions, body gels, treatment creams, skin protection ointments, moisturizing preparations such as moisturizing gels or moisturizing sprays, face and/or body moisturizers, as well as skin lightening preparations.

Examples of functional preparations are cosmetic compositions containing active ingredients such as hormone preparations, vitamin preparations, vegetable extract preparations, anti-ageing preparations, and/or antimicrobial (antibacterial or antifungal) preparations without being limited thereto.

Examples of hair care preparations which are suitable according to the invention and which may be mentioned are shampoos, hair conditioners (also referred to as hair rinses, hairdressing compositions, hair tonics, hair regenerating compositions, hair lotions, water wave lotions, hair sprays, hair creams, hair gels, hair oils, hair pomades or hair brilliantines. Accordingly, these are always preparations which are applied to the hair and the scalp for a shorter or longer time depending on the actual purpose for which they are used.

If the hair care preparations according to the invention are supplied as shampoos, these can be clear liquids, opaque liquids (with pearly luster effect), in cream form, gel-like or else in powder form or in tablet form, and as aerosols. The surfactant raw materials on which these shampoos are based can be anionic, cationic, nonionic and amphoteric in nature and also be present in combinations of these substances.

Examples of anionic surfactants suitable for the incorporation into the shampoo preparations according to the present invention are C_{10-20} alkyl- and alkylenecarboxylates, alkyl ether carboxylates, fatty alcohol sulfates, fatty alcohol ether sulfates, alkylolamide sulfates and sulfonates, fatty acid alkylolamide polyglycol ether sulfates, alkanesulfonates and hydroxyalkanesulfonates, olefinsulfonates, acyl esters of isothionates, alpha-sulfo fatty acid esters, alkylbenzenesulfonates, alkylphenol glycol ether sulfonates, sulfosuccinates, sulfosuccinic monoesters and diesters, fatty alcohol ether phosphates, protein-fatty acid condensation products, alkyl monoglyceride sulfates and sulfonates, alkyl glyceride ether sulfonates, fatty acid methyltaurides, fatty acid sarcosinates, and sulforicinoleates. These compounds and their mixtures are used in the form of their salts which are soluble in water or dispersible in water, for example the sodium, potassium, magnesium, ammonium, mono-, di- and triethanolammonium and analogous alkylanunonium salts.

Examples of suitable cationic surfactants are quaternary ammonium salts such as di(C_{10}-C_{24}alkyl)dimethylammonium chloride or bromide, preferably di (C_{12}-C_{18}alkyl)-dimethylammonium chloride or bromide; C_{10}-C_{24}-alkyldimethylethylammonium chloride or bromide; C_{10}-C_{24}-alkyltrimethylammonium chloride or bromide, preferably cetyltrimethylammonium chloride or bromide and C_{20}-C_{24}-alkyltrimethylammonium chloride or bromide; C_{10}-C_{24}4 -alkyldimethylbenzylammonium chloride or bromide, preferably C_{12}-C_{18}-alkyldime methylbenzylammoniumchloride; N-(C_{12}-C_{18}-alkyl)pyridinium chloride or bromide, preferably N- (C_{12}-C_{16}-alkyl)pyridinium chloride or bromide; N-(C_{12}-C_{18}-alkyl)isoquinolinium chloride, bromide or monoalkyl sulfate; N-

(C_{12}-C_{18}-alkyloylcolaminoformylmethyl)pyridinium chloride; N-(C_{12}-C_{18}-alkyl)-N-methylmorpholinium chloride, bromide or monoalkyl sulfate; N-(C_{12}-C_{18}-alkyl)-N-ethylmorpholinium chloride, bromide or monoalkyl sulfate; C_{16}-C_{18}-alkylpentaoxethylammonium chloride; isobutylphenoxyethoxyethyldimethyl-benzylammonium chloride; salts of N,N-diethylaminoethylstearylamide and oleylamide with hydrochloric acid, acetic acid, lactic acid, citric acid, phosphoric acid; N-acylamidoethyl-N,N-diethyl-N-methylammonium chloride, bromide or monoalkylsulfate and N-acylaminoethyl-N,N-diethyl-N-benzylammonium chloride, bromide or monoalkyl sulfate, where acyl is preferably stearyl or oleyl.

Examples of suitable nonionic surfactants which can be used as detergent substances are fatty alcohol ethoxylates (alkylpolyethylene glycols); alkylphenol polyethylene glycols; alkyl mercaptan polyethylene glycols; fattyamine ethoxylates (alkylaminopolyethylene glycols); fatty acid ethoxylates (acylpolyethylene glycols); polypropylene glycol ethoxylates (Pluronic); fatty acid alkylolamides (fatty acid amide polyethylene glycols); sucrose esters; sorbitol esters and polyglycol ether.

Examples of amphoteric surfactants which can be added to the shampoos are N-(C_{12}-C_{18}-alkyl)-.beta.-aminopropionates and N-(C_{12}-C_{18}-alkyl)-.beta.-iminodipropionates as alkali metal and mono-, di- and trialkylammonium salts; N-acylamidoalkyl-N,N-dimethylacetobetaine, preferably N-(C_8-C_{18}-acyl)amidopropyl-N,N-dimethylacetobetaine; C_{12}-C_{18}-alkyldimethylsulfopropylbetaine; amphoteric surfactants based on imidazoline (commercial name: Miranol®, Steinapon®), preferably the sodium salt of 1-(β-carboxymethyloxyethyl)-1-(carboxymethyl)-2-laurylimidazolinium; amine oxide, for example C_{12}-C_{18}-alkyldimethylamine oxide, fatty acid amidoalkyldimethylamine oxide.

The hair care preparations according to the invention can additionally contain further additives customary in hair care such as for example perfumes, colorants, also those which simultaneously dye or tint the hair, solvents, opacifying agents and pearly luster agents, for example esters of fatty acids with polyols, magnesium and zinc salts of fatty acids, dispersions based on copolymers, thickening agents such as sodium, potassium and ammonium chloride, sodium sulfate, fatty acid alkylolamides, cellulose derivatives, natural rubbers, also plant extracts, protein derivatives such as gelatin, collagen hydrolysates, polypeptides with a natural or synthetic basis, egg yolk, lecithin, lanolin and lanolin derivatives, fats, oils, fatty alcohols, silicones, deodorizing agents, substances with antimicrobial activity, substances with

antiseborrhoeic activity, substances with keratolytic and keratoplastic effect, such as, for example, sulfur, salicylic acid and enzymes as well as further anti-dandruff agents such as olamine, climbazol, zink pyrithion, ketoconazole, salicylic acid, sulfur, tar preparations, derivatives of undecenic acid, extracts of nettel, rosmary, cottonwood, birch, walnut, willow bark and/ or arnica.

The topical cosmetic compositions according to the present invention are advantageously O/W emulsions, W/O emulsions and/ or gels such as shower gels.

Furthermore, the topical compositions in the form of O/W emulsions, W/O emulsions and/ or gels according to the present invention are skin care preparation intended for the treatment of acne or for maintaining a healthy skin homeostasis and/ or for maintaining skin microbiome balance.

O/W emulsions according to the present invention advantageously comprise (i) phytantriol in an amount selected in the range of about 0.01 to 3 wt.-%, preferably in the range of 0.025 to 2 wt.-%, most preferably in the range of 0.04 to 1.5 wt.-%, based on the total weight of the composition, (ii) glyceryl caprylate in an amount selected in the range of about 0.01 to about 2 wt.-%, preferably in the range of 0.05 to 1. 5 wt.-%, most preferably in the range of 0.1 to 1 wt.-%, based on the total weight of the composition, (iii) water and (iv) at least one O/W- or Si/W-emulsifier selected from the list of glycerylstearatcitrate, glycerylstearate (self emulsifying), stearic acid, salts of stearic acid, polyglyceryl-3-methylglycosedistearate, ceteareth-20, steareth-2, steareth-12, PEG-40 stearate, phosphate esters and the salts thereof such as cetyl phosphate (Amphisol® A), diethanolamine cetyl phosphate (Amphisol® DEA), potassium cetyl phosphate (Amphisol® K), sodiumcetearylsulfat, sodium glyceryl oleate phosphate, hydrogenated vegetable glycerides phosphate, sorbitan oleate, sorbitan sesquioleate, sorbitan isostearate, sorbitan trioleate, lauryl glucoside, decyl glucoside, sodium stearoyl glutamate, sucrose polystearate and Hydrated Polyisobuten as well as mixtures thereof. Also, one or more synthetic polymers may be used as an emulsifier such as for example, PVP eicosene copolymer, acrylates/C10-3o alkyl acrylate crosspolymer, acrylates/steareth-20 methacrylate copolymer, PEG-22/dodecyl glycol copolymer, PEG-45/dodecyl glycol copolymer, and mixtures thereof. In a particular preferred embodiment the O/W-emulsifier is selected from the group of cetyl phosphates such as in particular potassium cetyl phosphate (commercially available as Amphisol® K), glyceryl stearate (and) PEG 100 stearate (commercially available as Arlacel® 165) and/ or polyalkylenglycolether

such as in particular laureth-35 (lauryl alcohol with 35 EO units; commercially available as Brij® 35).The at least one O/W emulsifier is preferably used in an amount of about 0.001 to 10 wt.-%, more preferably in an amount of 0.1 to 7 wt.-% with respect to the total weigh of the composition. Additionally, the cosmetic composition in the form of a O/W emulsion contains advantageously at least one co-emulsifier selected from the list of alkyl alcohols such as Cetyl Alcohol (Lorol C16, Lanette 16) Cetearyl Alcohol (Lanette® O), Stearyl Alcohol (Lanette® 18), Behenyl Alcohol (Lanette® 22), Glyceryl Monostearate, Glyceryl Myristate (Estol® 3650), Hydrogenated Coco- Glycerides (Lipocire Na10) without being limited to this and mixtures thereof. It is furthermore preferred it the O/W emulsion in addition comprises propanediol selected in an amount of 0.01 to about 10 wt.-%, preferably in the range of 0.5 to 7.5 wt.-%, most preferably in the range of 1 to 5 wt.-%, based on the total weight of the composition.

W/O emulsions according to the present invention advantageously comprise (i) phytantriol in an amount selected in the range 0.01 to 3 wt.-%, preferably in the range of 0.025 to 2 wt.-%, most preferably in the range of 0.04 to 1.5 wt.-%, based on the total weight of the composition, (ii) glyceryl caprylate in an amount selected in the range of about 0.01 to about 2 wt.-%, preferably in the range of 0.05 to 1. 5 wt.-%, most preferably in the range of 0.1 to 1 wt.-%, based on the total weight of the composition, (iii) water and (iv) at least one W/O- or W/Si-emulsifier selected from the list of polyglyceryl-2-dipolyhydroxystearat, PEG-30 dipolyhydroxystearat, cetyl dimethicone copolyol, polyglyceryl-3 diisostearate polyglycerol esters of oleic/isostearic acid, polyglyceryl-6 hexaricinolate, polyglyceryl-4-oleate, polygylceryl-4 oleate/PEG-8 propylene glycol cocoate, magnesium stearate, sodium stearate, potassium laurate, potassium ricinoleate, sodium cocoate, sodium tallowate, potassium castorate, sodium oleate, and mixtures thereof. Further suitable W/Si-emulsifiers are Lauryl Polyglyceryl-3 Polydimethylsiloxyethyl Dimethicone and/or PEG-9 Polydimethylsiloxyethyl Dimethicone and/or Cetyl PEG/PPG-10/1 Dimethicone and/or PEG-12 Dimethicone Crosspolymer and/or PEG/PPG-18/18 Dimethicone. The at least one W/O emulsifier is preferably used in an amount of about 0.001 to 10 wt.-%, more preferably in an amount of 0.2 to 7 wt.-% with respect to the total weigh of the composition. It is furthermore preferred it the W/O emulsion in addition comprises propanediol selected in an amount of 0.01 to about 10 wt.-%, preferably in the range of 0.5 to 7.5 wt.-%, most preferably in the range of 1 to 5 wt.-%, based on the total weight of the composition.

Gel preparations according to the present invention advantageously comprise (i) phytantriol in an amount selected in the range of 0.01 to 3 wt.-%, preferably in the range of 0.025 to 2 wt.-%, most preferably in the range of 0.04 to 1.5 wt.-%, based on the total weight of the composition, (ii) glyceryl caprylate in an amount selected in the range of about 0.01 to about 2 wt.-%, preferably in the range of 0.05 to 1. 5 wt.-%, most preferably in the range of 0.1 to 1 wt.-%, based on the total weight of the composition, (iii) water and (iv) at least one water soluble thickener. Such water-soluble thickeners are well known to a person skilled in the art and are e.g. listed in the "Handbook of Water soluble gums and resins" by Robert L. Davidson (Mc Graw Hill Book Company (1980)). Particularly suitable water soluble thickeners are selected from the group consisting of polyacrylic acids (e.g. commercially available under the tradename Carbomer or Carbopol®), homopolymers of 2-Acrylamido-2-methylpropansulfonic acid (e.g. commercially available as Rheothik®11-80), acrylate copolymers (e.g. commercially available under the tradename Pemulen® or Aculyn® 33), branched Poly(methacryloyloxyethyltrimethylammoniumchlorid) (INCI-name Polyquaternium-37), non-modified guar gums (e.g. commercially available under the tradename Jaguar), starch or derivatives thereof and/ or hydroxyalkylcellulosen. Preferably the water-soluble thickener is used in an amount of about 0.001 to 10 wt.-%, more preferably in an amount of 0.2 to 7 wt.-%, based on the total weigh of the composition. It is furthermore preferred it the gel preparation in addition comprises propanediol selected in an amount of 0.01 to about 10 wt.-%, preferably in the range of 0.5 to 7.5 wt.-%, most preferably in the range of 1 to 5 wt.-%, based on the total weight of the composition.

In a further advantageous embodiment, the topical compositions according to the present invention furthermore comprise glycerin in an amount selected in the range of 0.1 to 15 wt.-%, preferably in the range of 0.5 to 10 wt.-%, most preferably in the range of 1 to 5 wt.-%, based on the total weight of the composition.

In another advantageous embodiment, the topical compositions according to the present invention furthermore comprise xanthan gum as thickener in an amount selected in the range of 0.001 to 2 wt.-%, preferably in the range of 0.01 to 1 wt.-%, most preferably in the range of 0.1 to 0.5 wt.-%, based on the total weight of the composition.

The following examples are provided to further illustrate the compositions and effects of the present invention. These examples are illustrative only and are not intended to limit the scope of the invention in any way.

Example 1

The antimicrobial efficacy is assessed in analogy to the regulatory challenge test method (NF EN ISO11930). Thus, solutions of the respective active(s) in ethanol are prepared and further dissolved in physiological serum with 0.85 wt.-% NaCl in the concentrations as outlined in table 1 under sterile conditions. Samples containing phytantriol were solubilized in physiological serum supplemented with 10 wt.-% ethanol, samples containing glyceryl caprylate only were solubilized in physiological serum supplemented with 1 wt.-% ethanol. The solutions of the active(s) were deposed in 96-deep well plates (1.6 ml/well). The wells are contaminated with the Propionibacterium acnes at $2.5*10^5$ to $5.6*10^5$ cfu/ml to obtain the initial contamination as outlined in table 1. After the contamination, each well was thoroughly mixed to ensure a homogeneous distribution of Propionibacterium acnes. Then each plate was incubated at 22°C for 24h. The counting of the (remaining) population is carried out 24h after contamination.

Table 1: Results

Test solution	Time [h]	P. acnes colony count [cfu/ml]	Δ*	Log reduction
0.2 wt.-% phytantriol	0	310000		
	24	28000	-90.97%	-1.044
0.2 wt.-% glyceryl caprylate	0	310000		
	24	260	-99.92%	-3.076
0.3 wt.-% phytantriol	0	310000		
	24	3300	-98.94%	-1.973
0.3 wt.-% glyceryl caprylate	0	310000		
	24	10	-99.99%	-4.491
0.15 wt.-% phytantriol 0.15 wt.-% glyceryl caprylate	0	310000		
	24	0	-100%	-5.491
0.3 wt.-% phenoxyethanol	0	310000		
	24	300	-99.90%	-3.014

*Δ = -({microorganism count t=0} – {microorganism count t = 24h}/ {microorganism count t=0})*100

As can be seen in the table above the combination of phytantriol and glyceryl caprylate shows a synergistic effect against Propionibacterium acnes. The combination performs better than each of the substances at the same concentration

as well as the preservative phenoxyethanol at the same concentration. Thus, the combination of phytantriol and glyceryl caprylate can be used as an effective replacement of phenoxyethanol.

Example 2: Preservation Efficacy

The preservation efficacy of phytantriol in combination with glyceryl caprylate and optionally propanediol in a cosmetic formulation as outlined in table 2 has been assessed according ISO 11930. This test confirmed the efficacy of the combination of phytantriol and glyceryl caprylate, optionally further in combination with propanediol in the preservation of cosmetic formulations.

Table 2: Formulation

Trade name	**INCI**	**1**	**2**
Arlacel 165	Glyceryl Stearate (and) PEG-100 Stearate	3.0	3.0
Lanette O	Cetearyl Alcohol	3.0	3.0
Lanette 16	Cetyl Alcohol	2.0	2.0
Dow Corning 200 Fluid 350 CST	Dimethicone	3.0	3.0
Finsolv TN	C12-15 Alkyl Benzoate	15.0	15.0
Keltrol CG-T	Xanthan Gum	0.3	0.3
Glycerin	Glycerin	3.0	3.0
Phytantriol	Phytantriol	0.3	0.3
Dermosoft® GMCY	Glyceryl caprylate	0.5	0.5
Zemea®	Propanediol	-	3
Water	Aqua	ad 100	ad 100

Table 3: Result (0.3% Phytantriol, 0.5% Glyceryl Caprylate)

Days	*0*	*7*	*14*	*28*
Escherichia coli [CFU/g]	400000	300	2400	12000
Staphylococcus aureus [CFU/g]	320000	8300	<100	<100
Candida albicans [CFU/g]	440000	18000	<100	<100

Table 3: Result (0.3% Phytantriol, 0.5% Glyceryl Caprylate, 3% Propanediol)

Days	*0*	*7*	*14*	*28*
Escherichia coli [CFU/g]	400000	<100	<100	<100
Pseudomonas aeruginosa [CFU/g]	320000	<100	<100	<100
Staphylococcus aureus [CFU/g]	320000	<100	<100	<100
Candida albicans	440000	<100	<100	<100

As can be retrieved from table 2 the combination of phytantriol and glyceryl caprylate is suitable to suppress microbial growth in a typical cosmetic formulation, which effect is further enhanced by the addition of propanediol.

Claims

1. A topical composition comprising phytantriol and glyceryl caprylate, characterized in that the composition does not contain any phenoxyethanol and wherein the ratio (w/w) of phytantriol to glyceryl caprylate is selected in the range of 5:1 to 1:5.

2. The topical composition according to claim 1, wherein the amount of phytantriol is selected in the range of about 0.005 to 5 wt.-%, more preferably in the range of about 0.01 to 3 wt.-% and most preferably in the range of 0.025 to 2 wt.-%, such as in an amount of 0.04 to 1.5 wt.-% and particularly advantageous in an amount of 0.04 to 1 wt.-%, based on the total weight of the composition.

3. The topical composition according to claim 1 or 2, wherein the amount of the glyceryl caprylate is selected in the range of 0.01 to about 2 wt.-%, preferably in the range of 0.05 to 1.5 wt.-%, most preferably in the range of 0.1 to 1 wt.-%, based on the total weight of the composition.

4. The topical composition according to any one of claims 1 to 3, wherein the composition is a cosmetic or pharmaceutical composition.

5. The topical composition according to claim 4 wherein the composition is a shampoo preparation, a hair conditioner, an O/W emulsions, a W/O emulsion or a gel.

6. The topical composition according to any one of claim 1 or 5, wherein the composition furthermore comprises water and at least one agent selected from the group consisting of surfactants, emulsifiers, thickeners and oils.

7. A method of treating the skin and/ or the scalp, said method comprising the steps of contacting the skin and/ or scalp with a topical composition according to anyone of claim 1 to 6.

8. A method according to claim 7 for maintaining a healthy skin homeostasis and/ or for maintaining skin microbiome balance.

9. Use of a topical composition according to any one of claims 1 to 6 for maintaining a healthy skin homeostasis and/ or for maintaining skin microbiome balance.

10. The topical composition according to any one of claims 1 to 6 for use in the treatment, prevention and/or prophylaxis of Propionibacterium acnes induced diseases and/ or disorders.

11. The topical composition according to claim 10 for use in the treatment, prevention and/or prophylaxis of acne.

12. A method of killing and/ or inhibiting growth of P Propionibacterium acnes, said method comprising contacting said Propionibacterium acnes with a mixture of phytantriol and glyceryl caprylate.

13. Use of a mixture of phytantriol and glyceryl caprylate as antimicrobial agent against Propionibacterium acnes.

14. A method of preventing microbial decay and breakdown of a topical composition, wherein said method comprises adding to the topical composition phytantriol in combination with glyceryl caprylate as the antimicrobial agent.

15. The method according to claim 14, wherein additionally propanediol is added to the topical composition.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/080386

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K8/34 A61K8/37 A61Q17/00 A61Q19/00 A61P17/10
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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	EP 1 529 523 A1 (OREAL [FR]) 11 May 2005 (2005-05-11) claims 1-27	1-15
Y	US 2002/048558 A1 (NIEMIEC SUSAN M [US] ET AL) 25 April 2002 (2002-04-25) claims 1-25 paragraph [0066] - paragraph [0115]	1-15
A	WO 00/62745 A2 (PROCTER & GAMBLE [US]) 26 October 2000 (2000-10-26) claims 1-10	1-15

☐ Further documents are listed in the continuation of Box C.

☒ 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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 December 2018	03/01/2019

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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