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(54) Title: PHOTOPROTECTIVE AND SELF-TANNING COSMETIC EMULSIONS

(57) Abstract: The present invention relates to an oil-in-water emulsion comprising, in a physiologically acceptable support: - at least one emulsifier chosen from (sulfo)isophthalic acid polymers, -at least one hydrophilic gelling agent chosen from water-soluble or water-dispersible polymers or copolymers, containing at least two strong acid functions, which are at least partially neutralized in the form of a metal salt, -at least one lipophilic UV-screening agent, and -at least one skin-coloring agent, said emulsion having a pH ranging from 3 to 5.



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PHOTOPROTECTIVE AND SELF-TANNING COSMETIC EMULSIONS

The present invention relates to the field of cosmetic compositions, and in particular the field of photoprotective and self-tanning cosmetic compositions. More particularly, the invention relates to oil-in-water emulsions, for topical application, characterized by a pH between 3 and 5, stabilized with an emulsifier of (sulfo)isophthalic acid polymer type, and comprising a hydrophilic gelling agent of strong acid type neutralized in the form of a metal salt, lipophilic UV-screening agents and a skin-coloring agent.

It is known that radiation with wavelengths of between 280 nm and 400 nm makes possible tanning of the human epidermis and that radiation with wavelengths of between 280 and 320 nm, known as UV-B rays, harms the development of a natural tan. Exposure is also capable of bringing about a detrimental change in the biomechanical properties of the epidermis which is reflected by the appearance of wrinkles, leading to premature aging of the skin.

It is also known that UV-A rays with wavelengths of between 320 and 400 nm penetrate more deeply into the skin than UV-B rays. UV-A rays cause immediate and persistent browning of the skin. Daily exposure to UV-A rays, even of short duration, under normal conditions can result in damage to the collagen fibers and the elastin, which is reflected by a modification to the microrelief of the skin, the appearance of wrinkles and uneven pigmentation (liver spots, heterogeneity of the complexion).

The UV rays thus have to be screened out and there currently exist protective cosmetic compositions for the human epidermis containing UV-screening agents which are active with regard to screening out UV-A and UV-B radiation.

Moreover, skin-coloring agents, such as dihydroxyacetone (DHA), exist which make it possible to obtain color effects on the skin that are desired by consumers. In particular, during the use of suntan products in the first days of exposure to UV radiation, skin-coloring products are desired in order to obtain a suntanned complexion before the effects of the tanning start to show. Suntan formulations comprising a skin-coloring agent such as DHA thus exist.

However, such formulas have a limited screening efficiency, corresponding to an SPF level equal to 15, which is not sufficient to effectively protect against UV radiation, especially under a strong sun during the first exposures.

WO 2003/105787 relates to a cosmetic kit comprising two compositions to be applied onto one another, one providing a cosmetic effect and the other a skin-coloring effect. A first cosmetic composition may be an oil-in-water emulsion comprising UV-screening agents. A second cosmetic composition may comprise a skin-coloring agent.

WO 2007/0099434 describes a self-tanning composition comprising a self-tanning agent and an AMPS-derived thickening polymer, and having a pH between 4 and 4.5.

US 2008/01 15846 describes fluid photoprotective compositions, i.e which have a viscosity of less than 0.5 Pa.s at 25°C, of gel type, and which comprise a polyester amide, a UV-screening agent and an emulsifier. The pH of these compositions is not specified.

FR 2 847 464 describes vaporizable photoprotective compositions comprising UV-screening agents, hollow silica spheres and an emulsifier. The viscosity and the pH of these compositions are not given.

EP 1 481 663 describes self-tanning compositions, in emulsion form, comprising a self-tanning agent and a hydrophilic gelling agent, and having a pH between 3.5 and 4.5 and a viscosity of at least 4 Pa.s⁻¹, at 25°C, measured with a Brookfield RVT viscometer, T-C Spindle at 5 rpm. These compositions are aimed at improving the stability of the self-tanning agent.

There is a need to have self-tanning photoprotective compositions which have a high UV-screening level, good skin-coloring properties and excellent cosmetic qualities.

There is also a need to have self-tanning photoprotective compositions, in particular in emulsion form, which have good stability over time.

There is also a need to have self-tanning photoprotective compositions, in particular in emulsion form, which have a pleasant appearance and are comfortable to apply.

The object of the present invention is in particular to satisfy these needs.

Thus, according to one of its first subjects, the present invention relates to an oil-in-water emulsion comprising, in a physiologically acceptable support:

- at least one emulsifier chosen from (sulfo)isophthalic acid polymers,
 - at least one hydrophilic gelling agent chosen from water-soluble or water-dispersible polymers or copolymers, containing at least two strong acid functions, which are at least partially neutralized in the form of a metal salt,
 - at least one lipophilic UV-screening agent, and
 - at least one skin-coloring agent,
- said emulsion having a pH ranging from 3 to 5.

Unexpectedly, the inventors have observed that it is possible to stably formulate an oil-in-water emulsion by using an emulsifier of (sulfo)isophthalic acid polymer type, the emulsion having a pH ranging from 3 to 5, and comprising a lipophilic UV-screening agent, a skin-coloring agent, and a hydrophilic gelling agent of water-soluble or water-dispersible

polymer or copolymer type containing at least two strong acid functions, which are at least partially neutralized with a metal salt.

Such emulsions prove to be particularly stable over time, and have a high UV-screening level, good skin-coloring properties and excellent cosmetic qualities. In addition, they are comfortable to apply and have a pleasant appearance. Such emulsions are therefore particularly suitable for topical application for exerting photoprotective and self-tanning actions.

According to yet another aspect, the present invention relates to a cosmetic composition comprising an emulsion of the invention.

According to yet another aspect, the present invention relates to a packaging article comprising an emulsion or a cosmetic composition of the invention.

According to yet another aspect, the present invention relates to the use of an emulsifier chosen from (sulfo)isophthalic acid polymers, for stabilizing an oil-in-water emulsion comprising, in a physiologically acceptable support, at least one hydrophilic gelling agent chosen from water-soluble or water-dispersible polymers or copolymers comprising at least two strong acid functions, which are at least partially neutralized in the form of a metal salt, at least one lipophilic UV-screening agent, and at least one skin-coloring agent, the pH of said emulsion ranging from 3 to 5.

According to yet another aspect, the present invention relates to a cosmetic process for skincare and/or for making up the skin, comprising at least one step of applying, to at least one part of the surface of the skin, at least one layer of an emulsion or of a cosmetic composition of the invention.

Advantageously, the emulsions and compositions of the invention have good stability over time.

Advantageously again, the emulsions and compositions of the invention are applied evenly on the skin.

Also advantageously, the emulsions and compositions of the invention have good skin-coloring properties.

Also, according to another advantage, the emulsions and compositions of the invention have a high UV protection level.

Emulsifier

The expression "emulsifier of (sulfo)isophthalic acid polymer type" is intended to mean a polymer which makes it possible to stabilize oil-in-water emulsions and which comprises at least one sulfonic group and at least one isophthalic group.

An emulsifier of the invention may be a polyester.

An emulsifier suitable for the invention may be a polymer having a weight-average molecular weight ranging from approximately 1000 to 60000 and preferably from 5000 to 25000, determined by gel permeation chromatography.

5 An emulsifier of the invention may be a polymer having a glass transition temperature T_g , measured by differential scanning calorimetry (DSC) according to standard ASTM D3418-97, ranging from 10°C to 100°C and preferably greater than or equal to 30°C.

10 An emulsifier suitable for the invention can be obtained from isophthalic or phthalic acid, from the sodium salt of (sulfo)isophthalic acid, from glycol, and in particular diethylene glycol, and from 1,4-cyclohexanedimethanol.

By way of emulsifier suitable in particular for the invention, mention may be made of glycol phthalate/(sulfo)isophthalate copolymers.

15 According to one preferred embodiment variant, an emulsifier suitable for the invention may be the diethylene glycol/phthalate/(sulfo)isophthalate/1,4-cyclohexanedimethanol copolymer or the diglycol/cyclohexanedimethanol/isophthalate/(sulfo)isophthalate copolymer.

Even more preferably, an emulsifier of the invention may be the diglycol/cyclohexanedimethanol/isophthalate/(sulfo)isophthalate copolymer.

20 In particular, the raw materials sold under the name EASTMAN AQ POLYMER AQ35S, AQ38S, AQ55S, AS48 ULTRA by the company EASTMAN CHEMICAL are suitable for the invention.

According to one embodiment, the emulsifier may be present in an emulsion or a composition of the invention in order to provide appropriate viscosity, and in particular good stability.

25 An emulsion or a composition of the invention may comprise an emulsifier of (sulfo)isophthalic acid polymer type in an amount ranging from 0.5% to 10% by weight relative to the total weight of the composition, preferably from 1% to 6% by weight and even more preferably from 1.5% to 4% by weight relative to the total weight of the composition.

30 According to one embodiment variant, an emulsion or a composition of the invention may comprise an emulsifier of (sulfo)isophthalic acid polymer type according to an oil/emulsifier ratio at least equal to 3, and preferably ranging from 3 to 100, preferably from 5 to 50 and even more preferably from 5 to 25.

Hydrophilic gelling agent

An emulsion or composition of the invention comprises at least one hydrophilic gelling agent chosen from water-soluble or water-dispersible polymers or copolymers, containing at least two strong acid functions, which are at least partially neutralized in the form of a metal salt.

For the purpose of the invention, the term "strong acid function" is intended to mean an acid which, in aqueous solution, completely dissociates to a proton and a very weak base, termed conjugate base of the acid.

The term "strong acid function" is intended to mean a chemical functional group having a pKa of less than 3, preferably less than 2, the pKa being measured by titration of said group with a strong base in aqueous solution according to conventional techniques. The strong acid function is preferably chosen from phosphonic acid and sulfonic acid, and more particularly is a sulfonic acid.

The term "water-soluble or water-dispersible" is intended to mean polymers which, when introduced into an aqueous phase at 25°C, at a weight concentration equal to 1%, make it possible to obtain a macroscopically homogeneous and transparent solution, i.e. a solution with a maximum light transmittance value, at a wavelength equal to 500 nm, through a sample 1 cm thick, of at least 60% and preferably of at least 70%.

According to one preferred embodiment variant, a hydrophilic gelling agent of the invention can be neutralized, at least partially, with a metal salt chosen from a sodium salt or a potassium salt.

For the purpose of the invention, the term "at least partially neutralized" is intended to mean, with regard to the hydrophilic gelling agent, that at least one strong acid function is neutralized in the form of a metal salt.

According to one embodiment, a hydrophilic gelling agent of the invention can be chosen from crosslinked or noncrosslinked homopolymers or copolymers, comprising at least one acrylamido-2-propanesulfonic acid (AMPS®) monomer, which are at least partially neutralized with a metal salt, and preferably with sodium hydroxide.

A hydrophilic gelling agent of the invention may preferably be totally or virtually totally neutralized, i.e. at least 30% neutralized.

According to another embodiment, a hydrophilic gelling agent of the invention may be chosen from crosslinked or noncrosslinked homopolymers of acrylamido-2-propanesulfonic acid, or crosslinked or noncrosslinked copolymers obtained from acrylamido-

2-propanesulfonic acid and from one or more hydrophilic ethylenically unsaturated monomer(s) or hydrophobic ethylenically unsaturated monomer(s), not comprising a fatty chain.

5 The AMPS® polymers according to the invention may be crosslinked or noncrosslinked.

When the polymers are crosslinked, the crosslinking agents may be chosen from the olefinically polyunsaturated compounds commonly used for crosslinking polymers obtained by radical polymerization.

10 Examples of crosslinking agents that may be mentioned include divinylbenzene, diallyl ether, dipropylene glycol diallyl ether, polyglycol diallyl ethers, triethylene glycol divinyl ether, hydroquinone diallyl ether, ethylene glycol or tetraethylene glycol di(meth)acrylate, trimethylolpropane triacrylate, methylenebisacrylamide, methylenebismethacrylamide, triallylamine, triallyl cyanurate, diallyl maleate, tetraallylethylenediamine, tetraallyloxyethane, trimethylolpropane diallyl ether, allyl
15 (meth)acrylate, allylic ethers of alcohols of the sugar series, or other allylic or vinyl ethers of polyunctional alcohols, and also the allylic esters of phosphoric and/or vinylphosphonic acid derivatives, or mixtures of these compounds.

According to one preferred embodiment of the invention, the crosslinking agent is chosen from methylenebisacrylamide, allyl methacrylate and trimethylolpropane triacrylate
20 (TMPTA). The degree of crosslinking generally ranges from 0.01 mol% to 10 mol% and more particularly from 0.2 mol% to 2 mol% relative to the polymer.

The AMPS® polymers in accordance with the invention are water-soluble or water-dispersible. They are in this case:

25 - either "homopolymers" comprising only AMPS® monomers and, if they are crosslinked, one or more crosslinking agents such as those defined above;

- or copolymers obtained from AMPS® and from one or more hydrophilic or hydrophobic ethylenically unsaturated monomers and, if they are crosslinked, one or more crosslinking agents such as those defined above. When said copolymers comprise hydrophobic ethylenically unsaturated monomers, the latter do not comprise a fatty chain and are preferably
30 present in small amounts.

For the purpose of the present invention, the term "fatty chain" is intended to mean any hydrocarbon-based chain containing at least 7 carbon atoms.

The water-soluble or water-dispersible AMPS® copolymers according to the invention contain water-soluble ethylenically unsaturated monomers, hydrophobic monomers, or mixtures thereof.

The water-soluble co-monomers may be ionic or nonionic.

5 Among the ionic water-soluble co-monomers, mention may be made, for example, of the following compounds and salts thereof:

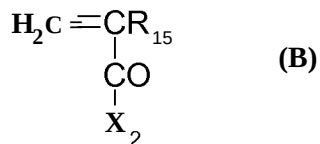
- (meth)acrylic acid,
- styrenesulfonic acid,
- vinylsulfonic acid and (meth)allylsulfonic acid,
- 10 - vinylphosphonic acid,
- maleic acid,
- itaconic acid,
- crotonic acid,
- water-soluble vinyl monomers of formula (A) below:



- R_i is chosen from H, -CH₃, -C₂H₅ or -C₃H₇
- X_i is chosen from:
- 20 - alkyl oxides of type -OR₂ where R₂ is a linear or branched, saturated or unsaturated hydrocarbon-based radical having from 1 to 6 carbon atoms, substituted with at least one sulfonic (-SO₃⁻) and/or sulfate (-SO₄⁻) and/or phosphate (-PO₄H₂⁻) group.

Among the nonionic water-soluble co-monomers, mention may be made, for example, of:

- 25 - (meth)acrylamide,
- N-vinylacetamide and N-methyl-N-vinylacetamide,
- N-vinylformamide and N-methyl-N-vinylformamide,
- maleic anhydride,
- vinylamine,
- 30 - N-vinyl lactams comprising a cyclic alkyl group having from 4 to 9 carbon atoms, such as N-vinylpyrrolidone, N-butyrolactam and N-vinylcaprolactam,
- vinyl alcohol of formula CH₂=CHOH,
- water-soluble vinyl monomers of formula (B) below:



in which:

- R₁₅ is chosen from H, -CH₃, -C₂H₅ or -C₃H₇

5

- X₂ is chosen from:

- alkyl oxides of type -OR₁₆ where R₁₆ is a linear or branched, saturated or unsaturated hydrocarbon-based radical having from 1 to 6 carbons, optionally substituted with a halogen (iodine, bromine, chlorine or fluorine) atom; a hydroxyl (-OH) group; ether.

Mention may be made, for example, of glycidyl (meth)acrylate, hydroxyethyl methacrylate, and (meth)acrylates of ethylene glycol, of diethylene glycol or of polyalkylene glycol.

Among the hydrophobic co-monomers without a fatty chain, mention may be made, for example, of:

- styrene and derivatives thereof, such as 4-butylstyrene, alpha-methylstyrene and vinyltoluene,

- vinyl acetate of formula CH₂=CH-OCOCH₃,

- vinyl ethers of formula CH₂=CHOR in which R is a linear or branched, saturated or unsaturated hydrocarbon-based radical having from 1 to 6 carbons,

- acrylonitrile,

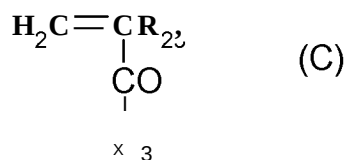
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- caprolactone,

- vinyl chloride and vinylidene chloride,

- silicone derivatives, resulting, after polymerization, in silicone polymers such as methacryloxypropyltris(trimethylsiloxy)silane and silicone methacrylamides,

- hydrophobic vinyl monomers of formula (C) below:



25

in which:

- R₂₃ is chosen from H, -CH₃, -C₂H₅ or -C₃H₇

- X_3 is chosen from:

- alkyl oxides of type $-OR_{24}$ where R_{24} is a linear or branched, saturated or unsaturated hydrocarbon-based radical having from 1 to 6 carbon atoms.

Mention may, for example, be made of methyl methacrylate, ethyl methacrylate, n-butyl (meth)acrylate, tert-butyl (meth)acrylate, cyclohexyl acrylate, isobornyl acrylate and 2-ethylhexyl acrylate.

The water-soluble or water-dispersible AMPS® polymers of the invention preferably have a molar mass ranging from 50 000 g/mol to 10 000 000 g/mol, preferably from 80 000 g/mol to 8 000 000 g/mol, and even more preferably from 100 000 g/mol to 7 000 000 g/mol.

As water-soluble or water-dispersible AMPS® homopolymers in accordance with the invention, mention may be made, for example, of crosslinked or noncrosslinked polymers of sodium acrylamido-2-methylpropanesulfonate, such as that used in the commercial product SIMULGEL 800® (CTFA name: Sodium Polyacryloyldimethyl Taurate).

As water-soluble or water-dispersible AMPS® copolymers in accordance with the invention, mention may be made, for example, of

- crosslinked acrylamide/sodium acrylamido-2-methylpropanesulfonate copolymers, such as that used in the commercial product SEPIGEL 305® (CTFA name: Polyacrylamide/Ci₃-Ci₄ Isoparaffin/ Laureth-7) or that used in the commercial product sold under the name SIMULGEL 600® (CTFA name: Acrylamide/Sodium Acryloyldimethyltaurate/Isohexadecane/Polysorbate-80®) by the company SEPPIC;

- copolymers of AMPS® and of sodium acrylate, for instance the sodium AMPS®/sodium acrylate copolymer, such as that used in the commercial product sold under the name SIMULGEL EG® by the company SEPPIC (CTFA name: Acrylamide/Sodium Acryloyldimethyltaurate/Isohexadecane/Polysorbate-80);

- copolymers of AMPS® and of hydroxyethyl acrylate, for instance the sodium AMPS®/hydroxyethyl acrylate copolymer, such as that used in the commercial product sold under the name SIMULGEL NS® by the company SEPPIC (CTFA name: Hydroxyethyl acrylate/Sodium Acryloyldimethyltaurate copolymer (and) Squalane (and) Polysorbate 60).

According to a more preferred variant of the invention, the hydrophilic gelling agents suitable for the invention may be acrylamido-2-propanesulfonic acid homopolymers and copolymers neutralized with sodium hydroxide, such as SIMULGEL EG®, SIMULGEL NS®, SIMULGEL FL®, SIMULGEL 600® and SIMULGEL 800® or else SEPINOV EMTIO® sold by the company SEPPIC.

The use of hydrophilic gelling agents suitable for the invention at a concentration ranging from 0.05% to 15% by weight relative to the total weight of the composition, and preferably from 0.5% to 10%, makes it possible to adjust the viscosity of the composition of the invention to a value greater than 0.5 Pa.s at 25°C. The viscosity is measured as indicated hereinafter.

According to one embodiment, an emulsion or a composition of the invention may comprise a hydrophilic gelling agent in a content ranging from 0.05% to 15% by weight relative to the total weight of the composition, preferably from 0.5% to 10% by weight and more preferentially from 0.5% to 5% by weight relative to the total weight of the composition.

Lipophilic UV-screening agent

The term "lipophilic UV-screening agent" is intended to mean a molecule which is capable of screening out UV radiation between 290 and 400 nm and which can be dissolved in the molecular or dispersed state in an oily phase in order to obtain a macroscopically homogeneous phase.

An emulsion or a composition of the invention may comprise at least one organic lipophilic UV-screening agent chosen from organic UV-screening agents which are active in the UV-A and/or UV-B range.

A lipophilic organic UV-screening agent suitable for the invention may be chosen from cinnamic derivatives; anthranilates; salicylic derivatives; dibenzoylmethane derivatives; camphor derivatives; benzophenone derivatives; β,β -diphenyl acrylate derivatives; triazine derivatives; benzotriazole derivatives; benzalmalonate derivatives, in particular those mentioned in Patent US 5 624 663; imidazolines; p-aminobenzoic acid (PABA) derivatives; benzoxazole derivatives, such as described in Patent Applications EP 0 832 642, EP 1 027 883, EP 1 300 137 and DE 10 162 844; screening polymers and screening silicones, such as those described in particular in Patent Application WO 93/04665; dimers derived from α -alkylstyrene, such as those described in Patent Application DE 198 55 649; 4,4-diarylbutadienes, such as described in Patent Applications EP 0 967 200, DE 197 46 654, DE 197 55 649, EP-A-1 008 586, EP 1 133 980 and EP 133 981; merocyanine derivatives, such as those described in Patent Applications WO 04/006 878, WO 05/058 269, WO 06/032 741, FR 2 957 249 and FR 2 957 250; and mixtures thereof.

As examples of UV-screening agents suitable for the invention, mention may be made of:

UV-A-screening agents

Dibenzoylmethane derivatives:

- 5 - Butylmethoxydibenzoylmethane sold in particular under the trade name PARSOL 1789 by DSM NUTRITIONAL PRODUCTS INC;
Isopropyl dibenzoylmethane;

Aminobenzophenones :

- 10 - n-Hexyl 2-(4-diethylamino-2-hydroxybenzoyl)benzoate sold in particular under the trade name UVINUL A+ by BASF;
-1,1'-(1,4-Piperazinediyl)bis[1-[2-[4-(diethylamino)-2-hydroxybenzoyl]phenyl]methanone (CAS 919803-06-8);

15 Anthranilic derivatives:

- Menthyl anthranilate sold in particular under the trade name NEO HELIOPAN MA by SYMRISE;

4,4-Diarylbutadiene derivatives:

- 20 - 1,1-Dicarboxy-(2,2'-dimethylpropyl)-4,4-diphenylbutadiene;

Merocyanine derivatives:

- Octyl 5-N,N-diethylamino-2-phenylsulfonyl-2,4-pentadienoate.

25 Within the context of the invention, and according to one particular embodiment, the following lipophilic UV-A-screening agents can be used:

- Butylmethoxydibenzoylmethane; and/or
- n-Hexyl 2-(4-diethylamino-2-hydroxybenzoyl)benzoate;

30 UV-B-screening agents

para-Aminobenzoates:

- Ethyl PABA;
- Ethyl dihydroxypropyl PABA;
- Ethylhexyl dimethyl PABA (ESCALOL 507 from ISP);

Salicylic derivatives:

- Homosalate sold in particular under the name EUSOLEX HMS by RONA/EM INDUSTRIES;

5 - Ethylhexyl salicylate sold in particular under the name NEO HELIOPAN OS by SYMRISE;

- Dipropylene glycol salicylate sold in particular under the name DIPSAL by SCHER;

- TEA salicylate sold under the name NEO HELIOPAN TS by SYMRISE;

10

Cinnamates:

- Ethylhexyl methoxycinnamate sold in particular under the trade name PARSOL MCX by DSM NUTRITIONAL PRODUCTS, INC.;

- Isopropyl methoxycinnamate;

15 - Isoamyl methoxycinnamate sold in particular under the trade name NEO HELIOPAN E 1000 by SYMRISE;

- Diisopropyl methylcinnamate;

- Cinnoxate;

- Glyceryl ethylhexanoate dimethoxycinnamate;

20

 β,β' -Diphenyl acrylate derivatives:

- Octocrylene sold in particular under the trade name UVINUL N539 by BASF;

- Etocrylene sold in particular under the trade name UVINUL N35 by BASF;

25

Benzylidenecamphor derivatives:

- 3-Benzylidenecamphor manufactured under the name MEXORYL SD by CHIMEX;

- Methylbenzylidenecamphor sold in particular under the name EUSOLEX 6300 by MERCK;

30

- Polyacrylamidomethylbenzylidenecamphor manufactured under the name MEXORYL SW by CHIMEX;

Triazine derivatives:

- Ethylhexyl triazone sold in particular under the trade name UVINUL T150 by BASF;

5 - Diethylhexylbutamidotriazone sold in particular under the trade name UVASORB HEB by SIGMA 3V;

- 2,4,6-tris(dineopentyl 4'-aminobenzalmalonate)-s-triazine;

- 2,4,6-tris(diisobutyl 4'-aminobenzalmalonate)-s-triazine;

- 2,4-bis(dineopentyl 4'-aminobenzalmalonate)-6-(n-butyl 4'-aminobenzoate)-s-triazine;

10 - 2,4-bis(n-butyl 4'-aminobenzoate)-6-(aminopropyltrisiloxane)-s-triazine;

Imidazoline derivatives:

- Ethylhexyl dimethoxybenzylidene dioxoimidazoline propionate;

15 Benzalmalonate derivatives:

- Polyorganosiloxanes containing benzalmalonate functions, such as Polysilicone-15, sold in particular under the trade name PARSOL SLX by DSM Nutritional Products, Inc.;

- Dineopentyl 4'-methoxybenzalmalonate.

20 Within the context of the invention, and according to one particular embodiment, the following lipophilic UV-B-screening agents can be used in the composition according to the invention:

- Ethylhexyl salicylate;

- Octocrylene;

25 - Ethylhexyl triazone,

Mixed UV-A- and UV-B-screening agents

Benzophenone derivatives:

- Benzophenone-1 sold in particular under the trade name UVINUL 400 by BASF;

30 - Benzophenone-2 sold in particular under the trade name UVINUL D50 by BASF;

- Benzophenone-3 or oxybenzone sold in particular under the trade name UVINUL M40 by BASF;

- Benzophenone-6 sold in particular under the trade name Helisorb 11 by Norquay;

- Benzophenone-8 sold in particular under the trade name Spectra-Sorb UV-24 by American Cyanamid;

- Benzophenone-10;

- Benzophenone-1 1;

5 - Benzophenone-1 2;

Phenylbenzotriazole derivatives:

- Drometrizole trisiloxane sold in particular under the name SILATRIZOLE by RHODIA CHIMIE or manufactured under the name MEROXYL XL by the company
10 CHIMEX;

Bisresorcinyltriazine derivatives:

- Bis(ethylhexyloxyphenol)methoxyphenyltriazine sold in particular under the trade name TINOSORB S by CIBA GEIGY;

15 Benzoxazole derivatives:

- 2,4-Bis[5-(1-dimethylpropyl)benzoxazol-2-yl-(4-phenyl)imino]-6-(2-ethylhexyl)imino-1,3,5-triazine, sold in particular under the name Uvasorb K2A by Sigma 3V.

The preferred organic UV-A- and UV-B-screening agents can be chosen from:

20 - Drometrizole trisiloxane;

- Bis(ethylhexyloxyphenol)methoxyphenyltriazine.

An emulsion or a composition of the invention may comprise at least one lipophilic UV-screening agent which is chosen from butylmethoxydibenzoylmethane; n-hexyl
25 2-(4-diethylamino-2-hydroxybenzoyl)benzoate; ethylhexyl salicylate; octocrylene; ethylhexyl triazone; drometrizole trisiloxane; bis(ethylhexyloxyphenol)methoxyphenyltriazine; and mixtures thereof.

An emulsion or a composition according to the invention may comprise at least one lipophilic UV-screening agent in a content ranging from 0.01% to 30% by weight relative
30 to the total weight of the composition, preferably from 0.1% to 25% by weight relative to the total weight of the composition.

Skin-coloring agents

An emulsion according to or a composition of the invention may comprise a coloring agent chosen from self-tanning agents and artificial skin-coloring agents, and mixtures thereof.

According to one preferred embodiment, an emulsion or a composition of the invention may comprise a monocarbonylated or polycarbonylated self-tanning agent, in particular chosen from isatin, alloxan, ninhydrin, glyceraldehyde, mesotartaric aldehyde, glutaraldehyde, erythrulose, pyrazoline-4,5-dione derivatives, dihydroxyacetone (DHA), 4,4-dihydroxypyrazolin-5-one derivatives, and mixtures thereof.

Yet more preferably, a self-tanning agent of the invention may be dihydroxyacetone.

Among the agents for artificial coloration of skin that are suitable for the invention, mention may in particular be made of:

(i) indole derivatives, for instance the monohydroxyindoles as described in Patent FR 2 651 126 (i.e.: 4-, 5-, 6- or 7-hydroxyindole) or the dihydroxyindoles as described in Patent EP-B-0 425 324 (i.e.: 5,6-dihydroxyindole, 2-methyl-5,6-dihydroxyindole, 3-methyl-5,6-dihydroxyindole or 2,3-dimethyl-5,6-dihydroxyindole);

(ii) plant extracts which are agents for artificial coloration of the skin, such as:

- extracts of "insoluble" redwoods of the *Pterocarpus* genus and of the *Baphia* genus, such as *Pterocarpus santalinus*, *Pterocarpus osun*, *Pterocarpus soyauxii*, *Pterocarpus erinaceus*, *Pterocarpus indicus* or else *Baphia nitida*, for instance those described in Patent Application EP-A-0 971683;

- plant extracts of the *Saxifraga* genus, such as *Saxifraga cuneifolia*, *Saxifraga glaucescens*, *Saxifraga rotundifolia*, *Saxifraga granulata*, *Saxifraga bulbifera*, *Saxifraga umbrosa* or *Saxifraga tridactylites*;

- plant extracts of the *Sorghum* genus, such as *Sorghum caudatum* or *Sorghum Bicolor*;

(iii) red or orange dyes of the fluorane type, such as

- tetrabromo fluorescein or eosin (CI 45380 or Red 21);

- phloxine B (CI 45410 or Red 27);

- diiodofluorescein (CI 45425 or Orange 10);

- dibromofluorescein (CI 45370 or Orange 5);

- the sodium salt of tetrabromo fluorescein (CI 45380 (Na salt) or Red 22);

- the sodium salt of phloxine B (CI 45410 (Na salt) or Red 28);

- the sodium salt of diiodofluorescein (CI 45425 (Na salt) or Orange 11);
- erythrosine (CI 45430 or Acid Red 51);
- phloxine (CI 45405 or Acid Red 98);
- (iv) caramel;

5 (v) and mixtures thereof.

According to one preferred embodiment, an emulsion or a composition of the invention may comprise a skin-coloring agent in a content ranging from 0.1% to 15% by weight relative to the total weight of the composition, and preferably from 0.5% to 10% by weight and more preferentially from 1% to 8% by weight relative to the total weight of the
10 composition.

Aqueous phase

The aqueous phase of the emulsions or compositions of the invention contains water and optionally other water-soluble or water-miscible organic solvents.

15 An aqueous phase suitable for the invention may comprise, for example, water chosen from water from a natural source, such as La Roche-Posay water, Vittel water, or Vichy waters, or a floral water.

The water-soluble or water-miscible solvents suitable for the invention comprise short chain, for example C_1-C_4 , monoalcohols, such as ethanol or isopropanol; diols or polyols, for instance ethylene glycol, 1,2-propylene glycol, 1,3-butylene glycol, hexylene glycol, diethylene glycol, dipropylene glycol, 2-ethoxyethanol, diethylene glycol monomethyl ether, triethylene glycol monomethyl ether, glycerol and sorbitol, and mixtures thereof.

25 According to one preferred embodiment, ethanol, propylene glycol, glycerol, and mixtures thereof, may more particularly be used.

The water or the aqueous phase may be present in a composition of the invention in a content ranging from 30% to 90% by weight, in particular from 35% to 75% by weight, and more particularly from 40% to 70% by weight, relative to the total weight of said composition.

30 A water-soluble organic solvent may be present in a composition of the invention in a content ranging from 1% to 30% by weight, in particular from 2% to 20% by weight, relative to the total weight of said composition.

Oily phase

An emulsion or composition of the invention comprises an oily phase comprising at least one oil.

For the purpose of the invention, the term "oily phase" is intended to mean a phase comprising at least one oil and all of the liposoluble and lipophilic ingredients and the fatty substances used to formulate the compositions of the invention.

The term "oil" is intended to mean any fatty substance which is in liquid form at ambient temperature (20 - 25°C) and at atmospheric pressure (760 mmHg).

10 An oil suitable for the invention may be volatile or non-volatile.

For the purpose of the invention, the term "volatile oil" is understood to mean an oil which is capable of evaporating on contact with the skin or keratin fiber in less than one hour, at ambient temperature and atmospheric pressure. The volatile oil(s) of the invention are volatile cosmetic oils, which are liquid at ambient temperature, having a non-zero vapor pressure, at ambient temperature and atmospheric pressure, ranging in particular from 0.13 Pa to 40 000 Pa (10^{-3} to 300 mmHg), in particular ranging from 1.3 Pa to 13 000 Pa (0.01 to 100 mmHg) and more particularly ranging from 1.3 Pa to 1 300 Pa (0.01 to 10 mmHg).

20 The term "non-volatile oil" means an oil that remains on the skin or keratin fiber at ambient temperature and atmospheric pressure for at least several hours, and that especially has a vapor pressure of less than 10^{-3} mmHg (0.13 Pa).

An oil suitable for the invention can be chosen from hydrocarbon-based oils, silicone oils, and mixtures thereof.

25 A hydrocarbon-based oil suitable for the invention can be an animal hydrocarbon-based oil, a vegetable hydrocarbon-based oil, a mineral hydrocarbon-based oil, or a synthetic hydrocarbon-based oil.

An oil suitable for the invention can advantageously be chosen from mineral hydrocarbon-based oils, vegetable hydrocarbon-based oils, synthetic hydrocarbon-based oils, silicone oils, and mixtures thereof.

30 For the purpose of the present invention, the term "silicone oil" means an oil comprising at least one silicon atom, and especially at least one Si-O group.

The term "hydrocarbon-based oil" means an oil mainly containing hydrogen and carbon atoms.

A hydrocarbon-based oil suitable for the invention can also optionally comprise oxygen, nitrogen, sulfur and/or phosphorus atoms, for example, in the form of hydroxyl, amine, amide, ester, ether or acid groups, and in particular in the form of hydroxyl, ester, ether or acid groups.

5

An oily phase of an emulsion of the invention generally comprises, in addition to the lipophilic UV-screening agent(s), at least one volatile or non-volatile hydrocarbon-based oil and/or one volatile and/or non-volatile silicone oil.

10

a) **Hydrocarbon-based oils**

Mention may in particular be made, as non-volatile hydrocarbon-based oils which can be used according to the invention, of:

(i) hydrocarbon-based oils of vegetable origin such as glyceride triesters, which are generally fatty acid triesters of glycerol, the fatty acids of which may have chain lengths varying from C_4 to C_{24} , these chains possibly being linear or branched, and saturated or unsaturated; these oils are especially wheatgerm oil, sunflower oil, grapeseed oil, sesame seed oil, corn oil, apricot oil, castor oil, shea oil, avocado oil, olive oil, soybean oil, sweet almond oil, palm oil, rapeseed oil, cottonseed oil, hazelnut oil, macadamia oil, jojoba oil, alfalfa oil, poppy oil, pumpkin oil, marrow oil, blackcurrant oil, evening primrose oil, millet oil, barley oil, quinoa oil, rye oil, safflower oil, candlenut oil, passion-flower oil and musk rose oil; or else caprylic/capric acid triglycerides, for instance those sold by the company Stearineries Dubois or those sold under the names Miglyol 810, 812 and 818 by the company Dynamit Nobel;

25

(ii) synthetic ethers having from 10 to 40 carbon atoms;

(iii) linear or branched hydrocarbons of mineral or synthetic origin, such as petroleum jelly, polydecenes, hydrogenated polyisobutene such as Parleam, and squalane, and mixtures thereof;

30

(iv) synthetic esters, such as the oils of formula $RCOOR'$ in which R represents a linear or branched fatty acid residue containing from 1 to 40 carbon atoms and R' represents a hydrocarbon-based chain, which is in particular branched, containing from 1 to 40 carbon atoms, on condition that $R + R' \geq 10$, for instance purcellin oil (cetostearyl octanoate), isopropyl myristate, isopropyl palmitate, Ci_2 -Cis alkyl benzoate, such as the product sold under the trade name FINSOLV TN or WITCONOL TN by the company WITCO or TEGOSOFT

TN by the company EVONIK GOLDSCHMIDT, 2-ethylphenyl benzoate, such as the commercial product sold under the name X-TEND 226 by the company ISP, isopropyl lanolate, hexyl laurate, diisopropyl adipate, isononyl isononanoate, diisopropyl sebacate, such as the product sold under the name DUB DIS by the company STEARINERIE DUBOIS, oleyl erucate, 2-ethylhexyl palmitate, isostearyl isostearate, alcohol or polyalcohol octanoates, decanoates or ricinoleates, for instance propylene glycol dioctanoate; hydroxylated esters, for instance isostearyl lactate, diisostearyl malate; and pentaerythritol esters; citrates or tartrates, for instance linear C₁₂-C₁₃ dialkyl tartrates, such as those sold under the name COSMACOL ETI by the company ENICHEM AUGUSTA INDUSTPJALE, and also the linear C₁₄-C₁₅ dialkyl tartrates such as those sold under the name COSMACOL ETL by the same company; acetates;

(v) fatty alcohols which are liquid at ambient temperature and have a branched and/or unsaturated carbon-based chain having from 12 to 26 carbon atoms, such as octyldodecanol, isostearyl alcohol, oleyl alcohol, 2-hexyldecanol, 2-buryloctanol or 2-undecylpentadecanol;

(vi) higher fatty acids, such as oleic acid, linoleic acid or linolenic acid;

(vii) carbonates such as dicaprylyl carbonate, for instance the product sold under the name CETIOL CC by the company COGNIS;

(viii) fatty amides, for instance isopropyl N-lauroyl sarcosinate, for instance the product sold under the trade name ELDEW SL205 from AJINOMOTO; and mixtures thereof.

Mention may in particular be made, as volatile hydrocarbon-based oils which can be used according to the invention, of hydrocarbon-based oils having from 8 to 16 carbon atoms, and in particular branched C₈-C₁₆ alkanes, such as C₈-C₁₆ isoalkanes of petroleum origin (also known as isoparaffms), such as isododecane (also known as 2,2,4,4,6-pentamethylheptane), isodecane or isohexadecane, or the alkanes described in the Patent Applications from Cognis, WO 2007/068371 or WO 2008/155059 (mixtures of different alkanes differing by at least one carbon). These alkanes are obtained from fatty alcohols, themselves obtained from coconut oil or palm oil, the oils sold under the Isopar or Permethyl trade names, branched C₈-C₁₆ esters, isohexyl neopentanoate and their mixtures.

Other volatile hydrocarbon-based oils, such as petroleum distillates, in particular those sold under the name Shell Solt by SHELL, can also be used. According to one

embodiment, the volatile solvent is chosen from volatile hydrocarbon-based oils having from 8 to 16 carbon atoms and their mixtures.

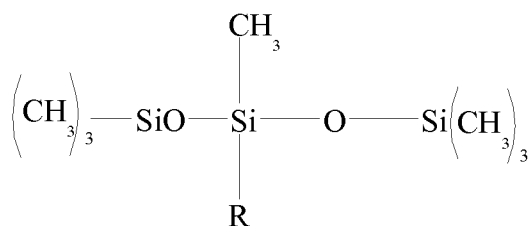
b) Silicone oils

5

The non-volatile silicone oils can be chosen in particular from non-volatile polydimethylsiloxanes (PDMSs), polydimethylsiloxanes comprising alkyl or alkoxy groups which are pendent and/or at the end of the silicone chain, which groups each have from 2 to 24 carbon atoms, or phenylated silicones, such as phenyl trimethicones, phenyl dimethicones, phenyl(trimethylsiloxy)diphenylsiloxanes, diphenyl dimethicones, 10 diphenyl(methyldiphenyl)trisiloxanes or (2-phenylethyl)trimethylsiloxysilicates.

As volatile silicone oils, mention may, for example, be made of linear or cyclic volatile silicone oils, in particular those having a viscosity of ≤ 8 centistokes ($8 \times 10^{-6} \text{ m}^2/\text{s}$), and having in particular from 2 to 7 silicon 15 atoms, these silicones optionally comprising alkyl or alkoxy groups having from 1 to 10 carbon atoms. Mention may in particular be made, as volatile silicone oil which can be used in the invention, of octamethylcyclotetrasiloxane, decamethylcyclopentasiloxane, dodecamethylcyclohexasiloxane, heptamethylhexyltrisiloxane, heptamethyloctyltrisiloxane, hexamethyldisiloxane, octamethyltrisiloxane, decamethyltetrasiloxane, 20 dodecamethylpentasiloxane and their mixtures.

Mention may also be made of the volatile linear alkyltrisiloxane oils of general formula (I):



where R represents an alkyl group comprising from 2 to 4 carbon atoms, one or more 25 hydrogen atoms of which can be replaced by a fluorine or chlorine atom.

Mention may be made, among the oils of general formula (I), of:

3-butyl- 1,1,1,3,5,5,5-heptamethyltrisiloxane,

3-propyl- 1,1,1,3,5,5,5-heptamethyltrisiloxane, and

30 3-ethyl- 1,1,1,3,5,5,5-heptamethyltrisiloxane,

corresponding to the oils of formula (I) for which R is, respectively, a butyl group, a propyl group or an ethyl group.

An oily phase of a composition of the invention (not including the lipophilic organic UV-screening agent) preferably ranges from 3% to 60% by weight and preferably from 5% to 30% by weight, and in particular from 10% to 25% by weight, relative to the total weight of the composition.

An oily phase according to the invention may also comprise other fatty substances, mixed with or solubilized in the oil.

Another fatty substance that may be present in the oily phase may be, for example:

- a fatty acid chosen from fatty acids containing from 8 to 30 carbon atoms, such as stearic acid, lauric acid, palmitic acid and oleic acid;

- a wax chosen from waxes such as lanolin, beeswax, carnauba or candelilla wax, paraffin wax, lignite wax or microcrystalline waxes, ceresin or ozokerite, synthetic waxes such as polyethylene waxes, Fischer-Tropsch waxes;

- a gum chosen from silicone gums (dimethiconol);

- a pasty compound, such as polymeric or non-polymeric silicone compounds, esters of a glycerol oligomer, arachidyl propionate, fatty acid triglycerides and derivatives thereof;

- and mixtures thereof.

Solid particles

According to one preferred embodiment, an emulsion or a composition of the invention may comprise solid particles. Such particles advantageously make it possible to optimize the sensory properties.

These solid particles are distinct from colorants. They are advantageously in the form of colorless or white, solid particles of all shapes, and are insoluble and dispersed in the medium of the compositions of the invention.

They may or may not be surface coated, and in particular they may be surface-treated with silicones, amino acids, fluoro derivatives or any other substance that promotes their dispersion and their compatibility in the compositions.

Among the inorganic solid particles that can be used in the invention, mention may be made of talc, mica, silica, kaolin, precipitated calcium carbonate, magnesium carbonate, magnesium hydrogen carbonate, hydroxyapatite, boron nitride, and mixtures thereof.

Among the organic solid particles that can be used in the invention, mention may be made of polyamide powders (Nylon® Orgasol from Atochem), poly-b-alanine powder and polyethylene powder, polytetrafluoroethylene powders (Teflon®), lauroyllysine, starch, tetrafluoroethylene polymer powders, hollow polymer microspheres such as EXPANCEL (NOBEL INDUSTRIE), metal soaps derived from organic carboxylic acids containing from 8 to 22 carbon atoms and preferably from 12 to 18 carbon atoms, for example zinc stearate, magnesium stearate or lithium stearate, zinc laurate or magnesium myristate, Polypore® L 200 (Chemdal Corporation), silicone resin microbeads (Tospearl ® from Toshiba, for example), polyurethane powders, in particular powders of crosslinked polyurethane comprising a copolymer, said copolymer comprising trimethylol hexyllactone. It may in particular be a hexamethylene diisocyanate/trimethylol hexyllactone polymer. Such particles are especially commercially available, for example, under the name PLASTIC POWDER D-400® or PLASTIC POWDER D-800® from the company TOSHIKI, and mixtures thereof.

Preferably, the solid particles suitable for the invention may be inorganic particles such as silica, mica or talc, or else synthetic polymers such as nylon, acrylic polymers, polyethylene, PTFE, PMMA, starch and silicones.

Even more preferably, use may be made, as solid particles, of silica, in particular sold under the name SILICA BEAD SB 150, or microspheres of acrylic polymers, in particular sold under the name EXPANCEL 551 DE40 D42.

The solid particles may be used in the emulsions or compositions of the invention in a proportion of from 0.1% to 20%, preferably from 0.5% to 10%, and even more preferentially from 1% to 5% by weight, relative to the total weight of the composition or of the emulsion.

ADJUVANTS

The compositions in accordance with the present invention may also comprise one or more standard cosmetic adjuvants chosen from organic solvents, ionic or nonionic, hydrophilic or lipophilic thickeners, softeners, humectants, opacifiers, stabilizers, emollients, silicones, antifoams, fragrances, preserving agents, anionic, cationic, nonionic, zwitterionic or amphoteric surfactants, active agents, fillers, coloring agents, polymers, propellants, basifying or acidifying agents or any other ingredient commonly used in the cosmetics and/or dermatological field.

Of course, a person skilled in the art will take care to choose the optional adjuvant or adjuvants added to the composition according to the invention so that the advantageous

properties intrinsically attached to the composition in accordance with the invention are not, or not substantially, detrimentally affected by the envisaged addition.

Mention may be made, among organic solvents, for example, of lower alcohols and polyols. The latter can be chosen from glycols and glycol ethers, such as ethylene glycol, propylene glycol, butylene glycol, dipropylene glycol or diethylene glycol.

Mention may be made, among the acidifying agents, by way of example, of inorganic or organic acids, such as hydrochloric acid, orthophosphoric acid, sulfuric acid, carboxylic acids, such as acetic acid, tartaric acid, citric acid or lactic acid, or sulfonic acids.

The cosmetic compositions according to the invention may be used, for example, as care products and/or antisun protection products for the face and/or the body, of liquid to semi-liquid consistency, such as milks, more or less rich creams, or cream-gels. They may optionally be packaged in aerosol form and may be in the form of a foam or a spray.

The compositions according to the invention in the form of vaporizable fluid lotions in accordance with the invention are applied to the skin or the hair in the form of fine particles by means of pressurization devices. The devices in accordance with the invention are well known to those skilled in the art and comprise non-aerosol pump-dispensers or "atomizers", aerosol containers comprising a propellant and also aerosol pump-dispensers using compressed air as propellant. These devices are described in Patents US 4 077 441 and US 4 850 517 (which form an integral part of the content of the description).

The compositions packaged in aerosol form in accordance with the invention generally contain conventional propellants, for instance hydrofluoro compounds, dichlorodifluoromethane, difluoroethane, dimethyl ether, isobutane, n-butane, propane or trichlorofluoromethane. They are preferably present in amounts ranging from 15% to 50% by weight, with respect to the total weight of the composition.

The compositions according to the invention may also furthermore comprise additional cosmetic and dermatological active agents.

Mention may be made, among active agents, of:

- vitamins (A, C, E, K, PP, and the like) and their derivatives or precursors, alone or as mixtures;
- anti-aging agents;
- antioxidants;
- free-radical scavengers;
- antiglycation agents;

- calmatives;
- NO-synthase inhibitors;
- agents for stimulating the synthesis of dermal or epidermal macromolecules and/or for preventing their degradation;
- 5 - agents for stimulating fibroblast proliferation;
- agents for stimulating keratinocyte proliferation;
- dermorelaxants;
- tensioning agents;
- matting agents;
- 10 - keratolytic agents;
- desquamating agents;
- moisturizers, for instance polyols such as glycerol, butylene glycol or propylene glycol;
- agents that act on the energy metabolism of cells;
- insect repellents;
- 15 - substance P or substance CRGP antagonists;
- antiwrinkle agents;
- agents which modulate the pigmentation of the skin or hair;
- astringent agents;
- sebum regulators and antiseborrheic agents.

20

Of course, a person skilled in the art will take care to select the aforementioned optional additional compound or compounds and/or the amounts thereof so that the advantageous properties intrinsically attached to the compositions in accordance with the invention are not, or not substantially, detrimentally affected by the envisaged addition(s).

25

Obtaining the emulsions

Any process for preparing an oil-in-water emulsion which is normally used in the field may be suitable for the invention.

In particular, the emulsification processes that may be used are of the paddle or propeller, rotor-stator and HPH type.

30

To obtain stable emulsions with a low content of emulsifier (oil/emulsifier ratio > 25), it is possible to make the dispersion in a concentrated phase and then to dilute the dispersion with the rest of the aqueous phase.

Packaging article

A packaging article of the invention will naturally be chosen by a person skilled in the art according to the galenical form of the composition to be packaged.

5 A composition of the invention may be advantageously packaged in a pot, a tube for a stick, a tube of cream or paste, or in a container with flexible or deformable walls or with stiff walls.

10 A container consisting of a rigid shell may comprise means for distributing the composition. These distribution means may be a simple orifice, which is blocked by a removable cap, or a push button associated with a pump for expelling a part of the composition contained in the container. The compositions of the invention can be packaged in containers of aerosol can type. A container with flexible or deformable walls can have an orifice that can be blocked by a removable cap, the composition being expelled through the orifice by pressure on the walls, or there may be a bottle which has a push button and a pump.

15 A composition of the invention may be stored under vacuum, in a hermetically closed airtight compartment, like, for example, a vacuum-packed brick. Also, a composition according to the invention may be packaged "under a protective atmosphere". Packaging "under a protective atmosphere" consists in modifying the composition of the internal atmosphere of a packaging with the aim of improving the shelf-life of its content. This technique consists in reducing the level of oxygen in order to slow down the growth of aerobic
20 life forms and oxidation reactions. The oxygen removed can be replaced with other gases.

A packaging article can be made at least in part of plastics or other suitable polymeric materials. According to one particular embodiment, a packaging article can also be made using materials which make it possible to isolate the composition from any light sources.

25 The packaging article can also be at least partly made of thermal insulation materials. By way of examples of materials of this type, mention may be made of fabrics, fabrics made of glass fibers coated with silicone, textiles based on ceramic fibers, cellulose fibers, polystyrene, styrofoam, and packaging films. A cold gel or liquid may also be used as thermal insulation material.

30 According to one particular embodiment, a packaging article may be disposable and opened just before its use by the consumer.

Cosmetic process

The invention relates to a cosmetic process for skincare and/or for making up the skin. Such a process comprises at least one step of applying, to at least one part of the surface of the skin, at least one layer of an emulsion or of a cosmetic composition of the invention.

5 Advantageously, a process of the invention makes it possible to obtain a photoprotective and/or self-tanning effect on the surface of the treated skin.

The invention also relates to a cosmetic treatment process for artificially tanning and/or browning the skin and which comprises at least one step consisting in applying thereto an effective amount of a composition of the invention.

10

Stability

The emulsions and compositions of the invention are stable, i.e. they do not experience any modification of their microscopic and macroscopic appearances after storage for 2 months at ambient temperature, i.e. approximately 25°C.

15 The microscopic appearance of the emulsions is evaluated using an optical microscope and the sample placed between a slide and a coverslip; the macroscopic appearance is evaluated visually with the naked eye.

pH

20 The pH of a composition or of an emulsion of the invention can be measured as follows. The pH of a composition or of an emulsion of the invention is measured using a pH-meter of MPC227 or SevenEasy pH type from Mettler Toledo.

The pH of a composition or of an emulsion of the invention can range from 3 to 5, preferably from 3 to 4.5, and even more preferentially from 3.2 to 4, or even from 3.5 to 3.8.

25

Oil drop size

The emulsions of the invention are characterized by a mean oil drop size of greater than 1 micrometer.

30 The expression "mean size" of the particles is understood to mean the parameter D[4,3] measured using a "Mastersizer 2000" particle size analyzer (Malvern). The light intensity scattered by the particles as a function of the angle at which they are lit is converted to size distribution according to Mie theory. The parameter D[4,3] is measured; this is the mean diameter of the sphere having the same volume as the particle. For a spherical particle, reference will often be made to the "mean diameter".

An emulsion of the invention can comprise oil drops with a mean size at least equal to 1 μm , and preferably ranging from 1 to 10 μm .

Viscosity

5 An emulsion or a composition of the invention advantageously has a viscosity such that it remains stable over time, that it has a homogeneous and pleasant appearance and that it is comfortable to apply to the skin.

An emulsion of the invention or a composition of the invention can have a viscosity at least equal to 0.5 Pa.s, measured at 25°C, using a Rheomat 180 viscometer and a type 3 spindle, the rotational speed of which is equal to 200 rpm, after 10 minutes of rotation.

10 According to one particular embodiment, an emulsion or a composition of the invention can have a viscosity ranging from 0.5 Pa.s to 1000 Pa.s, preferably from 0.5 Pa.s to 100 Pa.s and even more preferentially from 0.5 Pa.s to 5 Pa.s.

In vitro protocol for evaluating the screening efficacy

15 The screening efficacy, or sun protection factor (SPF) of an emulsion or of a composition of the invention can be determined according to the "*in vitro*" method described by B. L. Diffey in J. Soc. Cosmet. Chem. 40, 127-133 (1989).

An emulsion or a composition of the invention can be applied to a rough plate of PMMA, in the form of a homogeneous and even deposit at a rate of 1 mg/cm². The measurements can be made using a UV-1000S spectrophotometer from the company Labsphere.

Method for evaluating skin coloration

The degree of coloration that can be induced by an emulsion or a composition of the invention can be determined *in vitro* according to the following protocol.

25 Samples of Vitro-Skin™ 2.5 cm x 2.5 cm in size are hydrated for 24 hours in a container containing 20% glycerol in water.

Vitro-skin is a substrate that imitates the properties of the surface of human skin. It contains proteins and lipids and has a typography, a pH, a critical surface tension and an ionic strength similar to those of human skin.

30 The formula to be tested is spread, at a rate of 2 mg/cm², using a fingerstall, onto the Vitro-skin™ samples. The Vitro-skin™ samples are then incubated in a hermetic container containing an 80/20 glycerol/water solution and, finally, placed in an incubator at 32°C. Colorimetric measurements are carried out at t = 15 min and 24 hours in order to monitor the change in coloration over time.

Material used: Minolta CM2600d spectrophotometer; Illuminant: D65; Observation angle: 10°; SCE: specular excluded.

The results are expressed in the L, a*, b* system. For the evaluation of the change in coloration, the important parameter is ΔE between the time when the formula is applied (t=0), and 15 min or 24 hours.

$$(\Delta E)^2 = [(AL)^2 + (Aaf + (Ab)^2].$$

In the description and the examples that follow, unless otherwise mentioned, the percentages are weight percentages and the ranges of values written in the form "between ... and ..." include the stated lower and upper limits.

The ingredients are mixed, before being formed, in the order and under conditions that may be readily determined by a person skilled in the art.

The content and nature of the ingredients used in the compositions of the invention are adjusted by a person skilled in the art so as not to substantially affect the properties required for the compositions of the invention.

The examples hereinafter are given as non-limiting illustrations of the invention.

EXAMPLES

Example 1

The following compositions of oil-in-water emulsion type were prepared.

Phases	Ingredients	Example 1	Example 2 (comparative)
A	Water	q.s. for 100	q.s. for 100
	Diglycol/cyclohexanedimethanol/isophthalates /sulfoisophthalates copolymer (AQ 38S POLYMER from EASTMAN)	2	0
	GLYCERYL STEARATE (and) PEG- 100 STEARATE (Arlacel 165)	0	1
	Glycerol	6	6
	Propylene glycol	6	6

	Xanthan gum	0.5	0
	Pentasodium salt of ethylenediaminetetramethylenephosphonic acid in water at 33%, nonstabilized	0.2	0.2
B	Butylmethoxydibenzoylmethane (PARSOL 1789 -DSM)	4.5	4.5
	Octocrylene (UVINUL N 539 -BASF)	4	4
	Diisopropyl sebacate (Dub Dis)	5	5
	BIS(ETHYLHEXYLOXYPHENOL)METHOXYPHENYLTRIAZINE (Tinosorb S)	2	2
	DIETHYLAMINO HYDROXYBENZOYL HEXYL BENZOATE (Uvinul A+)	1	1
	Octyl salicylate (Neo Heliopan OS)	5	5
	ETHYLHEXYL TRIAZONE (Uvinul T150)	2.5	2.5
	DROMETRIZOLE TRISILOXANE (Mexoryl XL)	3	3
	C12/C15 alkyl benzoate (TEGOSOFT TN)	5	5
	POLYDIMETHYLSILOXANE	3	3
	PHENOXYETHANOL	0.7	0.7
	ETHYLHEXYL SALICYLATE	0.4	0.4
	Stearyl alcohol	0	1
C	Water	13.7	13.7
	SODIUM POLYACRYLOYLDIMETHYL TAURATE (and) POLYSORBATE 80 (and) SORBITAN OLEATE (SIMUGEL 800)	0.5	3.5
D	Water	4	4
	Dihydroxyacetone	2	2.5
E	Water	1	1
	Citric acid	0.12	0.12
F	Silica (Silica bead SB 150)	1	1
	ACRYLATE COPOLYMER (Expancel 551 DE 40 D42)	0.5	0.5
G	Ethanol	3	0
TOTAL		100	100

Preparing the emulsions

The aqueous phase A and oily phase B are prepared separately by mixing the raw materials, with mechanical stirring, at 80°C. The solutions obtained are macroscopically homogeneous.

5 The emulsion is prepared by slow introduction of the oily phase into the aqueous phase with stirring using a Moritz homogenizer at a stirring speed of 4500 rpm (revolutions per minute) for 30 minutes. The emulsion obtained is cooled to ambient temperature and then the phases C, D, E, F and G are added thereto with gentle stirring.

Characterizing the emulsions

The emulsions obtained have oil drops with a size of between 1 µm and 10 µm.

The *in vitro* evaluation of the screening efficacy or sun protection factor (SPF), the evaluation of the skin coloration, the pH, the stability and the diameter of the oil drops of the emulsions were determined as indicated in the description.

Parameters	Example 1	Example 2 (comparative)
pH	3.7	4
Mean diameter of the drops (microns)	5	3
Viscosity (Pa.s)	0.64	2.25
Stability	Yes	No
<i>in vitro</i> SPF	54 +/- 7	37 +/- 6

The emulsion of the invention (example 1) is advantageously stable, has a pH between 3 and 5, and a viscosity greater than 0.5 Pa.s⁻¹ at 25°C, and the oil drops have a mean diameter greater than 1 µm.

The SPF of the composition of the invention (example 1) is approximately 54, whereas that of the composition outside the invention (example 2) is approximately 37.

The results obtained between an emulsion of the invention and a comparative emulsion show that only the composition of the invention makes it possible to obtain a high

level of screening efficacy, associated with good stability and excellent cosmetic qualities in terms of skin coloration and cosmeticity.

For the composition based on another type of emulsifying ingredient, the performance levels in terms of screening efficacy and skin coloration are below those of the
5 composition of the invention.

CLAIMS

1. An oil-in-water emulsion comprising, in a physiologically acceptable support:

- at least one emulsifier chosen from (sulfo)isophthalic acid polymers,

5 - at least one hydrophilic gelling agent chosen from water-soluble or water-dispersible polymers or copolymers, containing at least two strong acid functions, which are at least partially neutralized in the form of a metal salt,

- at least one lipophilic UV-screening agent, and

- at least one skin-coloring agent,

10 said emulsion having a pH ranging from 3 to 5.

2. The emulsion as claimed in the preceding claim, in which said emulsifier is chosen from glycol phthalate/(sulfo)isophthalate copolymers, and in particular is the diethylene glycol/phthalate/(sulfo)isophthalate/1,4-cyclohexanedimethanol copolymer or the diglycol/cyclohexanedimethanol/isophthalate/(sulfo)isophthalate copolymer.

15 3. The emulsion as claimed in claim 1 or 2, in which said emulsifier is present in an amount ranging from 0.5% to 10% by weight relative to the total weight of the composition, preferably from 1% to 6% by weight and even more preferably from 1.5% to 4% by weight relative to the total weight of the composition.

4. The emulsion as claimed in any one of the preceding claims, in which the
20 oil/emulsifier ratio is at least equal to 3, and preferably ranges from 3 to 100, preferably from 5 to 50, and even more preferably from 5 to 25.

5. The emulsion as claimed in any one of the preceding claims, in which said metal salt of said hydrophilic gelling agent is a sodium salt or a potassium salt.

25 6. The emulsion as claimed in any one of the preceding claims, in which said hydrophilic gelling agent is chosen from crosslinked or noncrosslinked homopolymers or copolymers, comprising at least the acrylamido-2-propanesulfonic acid monomer, which are at least partially neutralized with sodium hydroxide.

7. The emulsion as claimed in any one of the preceding claims, in which said
30 hydrophilic gelling agent is chosen from crosslinked or noncrosslinked homopolymers of acrylamido-2-propanesulfonic acid, or crosslinked or noncrosslinked copolymers obtained from acrylamido-2-propanesulfonic acid and from one or more hydrophilic ethylenically unsaturated monomer(s) or hydrophobic ethylenically unsaturated monomer(s), not comprising a fatty chain.

8. The emulsion as claimed in any one of the preceding claims, in which said hydrophilic gelling agent is present in a content ranging from 0.05% to 15% by weight relative to the total weight of the composition, preferably from 0.5% to 10% by weight and more preferentially from 0.5% to 5% by weight relative to the total weight of the composition.

5 9. The emulsion as claimed in any one of the preceding claims, in which said lipophilic UV-screening agent is chosen from cinnamic derivatives; anthranilates; salicylic derivatives; dibenzoylmethane derivatives; camphor derivatives; benzophenone derivatives; β,β -diphenyl acrylate derivatives; triazine derivatives; benzotriazole derivatives; benzalmalonate derivatives; imidazolines; p-aminobenzoic acid (PABA) derivatives; 10 benzoxazole derivatives; screening polymers and screening silicones; dimers derived from a -alkylstyrene; 4,4-diarylbutadienes; merocyanine derivatives; and mixtures thereof.

10 11. The emulsion as claimed in the preceding claim, in which said lipophilic UV-screening agent is chosen from butylmethoxydibenzoylmethane; n-hexyl 2-(4-diethylamino-2-hydroxybenzoyl)benzoate; ethylhexyl salicylate; octocrylene; ethylhexyl triazone; 15 drometrizole trisiloxane; bis(ethylhexyloxyphenol)methoxyphenyltriazine; and mixtures thereof.

20 12. The emulsion as claimed in any one of the preceding claims, in which said lipophilic UV-screening agent is present in a content ranging from 0.01% to 30% by weight relative to the total weight of the composition, preferably from 0.1% to 25% by weight relative to the total weight of the composition.

13. The emulsion as claimed in any one of the preceding claims, in which said coloring agent is chosen from self-tanning agents and artificial skin-coloring agents, and mixtures thereof.

25 14. The emulsion as claimed in the preceding claim, in which said self-tanning agent is chosen from isatin, alloxan, ninhydrin, glyceraldehyde, mesotartaric aldehyde, glutaraldehyde, erythrulose, pyrazoline-4,5-dione derivatives, dihydroxyacetone (DHA), and 4,4-dihydroxypyrazolin-5-one derivatives, and mixtures thereof.

30 15. The emulsion as claimed in any one of the preceding claims, in which said skin-coloring agent is present in a content ranging from 0.1% to 15% by weight relative to the total weight of the composition, preferably from 0.5% to 10% by weight and more preferentially from 1% to 8% by weight relative to the total weight of the composition.

16. The emulsion as claimed in any one of the preceding claims, said emulsion having a viscosity greater than 0.5 Pa.s, measured at 25°C, using a Rheomat 180 viscometer

and a type 3 spindle, the rotational speed of which is equal to 200 rpm, after 10 minutes of rotation.

16. The emulsion as claimed in the preceding claim, said emulsion having a viscosity ranging from 0.5 Pa.s to 1000 Pa.s, preferably from 0.5 Pa.s to 100 Pa.s and even
5 more preferentially from 0.5 Pa.s to 5 Pa.s.

17. The emulsion as claimed in any one of the preceding claims, said emulsion comprising oil drops with a mean size at least equal to 1 μm , and preferably ranging from 1 to 10 μm .

18. The emulsion as claimed in any one of the preceding claims, said emulsion
10 comprising solid particles.

19. A cosmetic composition comprising an emulsion as claimed in any one of the preceding claims.

20. A packaging article comprising an emulsion as claimed in any one of claims 1 to 18, or a cosmetic composition as claimed in claim 19.

21. The use of an emulsifier chosen from (sulfo)isophthalic acid polymers, for stabilizing an oil-in-water emulsion comprising, in a physiologically acceptable support, at least one hydrophilic gelling agent chosen from water-soluble or water-dispersible polymers or copolymers comprising at least two strong acid functions, which are at least partially neutralized in the form of a metal salt, at least one lipophilic UV-screening agent, and at least
20 one skin-coloring agent, the pH of said emulsion being adjusted so as to be included in a range of from 3 to 5.

22. A cosmetic process for skincare and/or for making up the skin, comprising at least one step of applying, to at least one part of the surface of the skin, at least one layer of an emulsion as claimed in any one of claims 1 to 18, or of a cosmetic composition as claimed in
25 claim 19.