

【DESCRIPTION】**【Invention Title】**

WATER-IN-SILICONE TYPE COSMETIC COMPOSITION
COMPRISING ORGANIC SUNSCREEN AGENT

【Technical Field】

[1] The following disclosure relates to a water-in-silicone type cosmetic composition including an organic sunscreen.

[2]

【Background Art】

[3] Ultraviolet (UV) causes skin erythema, swelling, freckles, and the like, and is even confirmed as a major cause of skin cancer, and thus there are a number of researches conducted on various skin diseases caused by the UV. In general, the UV is classified into UV-C wavelengths of 240 to 280 nm, UV-B wavelengths of 280 to 320 nm, and UV-A wavelengths of 320 to 400 nm, depending on wavelengths thereof. Among the wavelengths, it is known that the UV-C passes through an ozone layer and disappears without reaching the surface of the earth, the UV-B intrudes to the epidermis of the skin, causing erythema, freckles, swelling, and the like, and the UV-A intrudes to the dermis of the skin, thereby inducing skin aging and skin irritation such as promotion of wrinkles or melanin formation, or the like, or inducing skin cancers.

[4] Recently, as UV irradiation dose of the surface of the earth increases due to the breakage of the ozone layer, the market for products having a main purpose of UV blocking is growing year by year, and the consumer's need for a cosmetic composition for UV blocking throughout the entire wavelength region is on the rise.

[5] In general, for a cosmetic composition for UV blocking, a water-in-oil (W/O) type where an oil phase is an external phase or an oil-in-water (O/W) type where a water phase is an external phase has been suggested.

[6] The O/W type has an advantage of providing more freshness when applied to the skin as compared to the product of W/O type, but still has a disadvantage in that the O/W type product is easily washed away by sweat or water despite continuing studies to improve water resistance. Thus, the O/W type has a disadvantage in that long-lasting property of the UV blocking effect is remarkably deteriorated.

[7] On the other hand, the W/O type is more long-lasting than the O/W type but has a disadvantage that the feeling on use is heavy and sticky, which is associated with high viscosity of general W/O type products. In addition, the W/O type products are produced with high viscosity by increasing a ratio of the water phase which is the internal phase in order to control the feeling on use to be light,

thus having a disadvantage in that emulsion stability is lower than that of O/W type products. On the contrary, W/O type products having a low viscosity have a problem in that when the product is stored for a long time in a container during distribution, the water phase as the internal phase and the oil phase as the external phase are separated, thus resulting in deterioration of stability of the product. Therefore, in order to increase the degree of stability, it is necessary to increase the viscosity, and when the viscosity increases, the disadvantage that the feeling on use is heavy and sticky occurs.

[8] Meanwhile, most organic UV sunscreens have poor stability to heat and light. In particular, bis-ethylhexyloxyphenol methoxyphenyl triazine has poor solubility with respect to solvent, and thus it is required to dissolve the bis-ethylhexyloxyphenol methoxyphenyl triazine in oil, or the like, having high polarity such as alkylbenzoate and to apply the dissolved material to the oil phase. As an alternative to solve these problems, composite particles containing an organic UV sunscreen such as bis-ethylhexyloxyphenol methoxyphenyl triazine, and the like, have been suggested, but the solubility problem has not been capable of being solved completely.

[9] Accordingly, the present inventors focused on the problems of conventional cosmetic compositions for UV

blocking and suggested a water-in-silicone type cosmetic composition capable of having water resistance and excellent close adhesion, and simultaneously imparting the feelings of lightness and silkiness when being used, and repeatedly studied for this cosmetic composition. As a result, the present inventors found that it was possible to provide a water-in-silicone type cosmetic composition which is capable of stably including bis-ethylhexyloxyphenol methoxyphenyl triazine to improve a problem bis-ethylhexyloxyphenol methoxyphenyl triazine to improve a problem that the bis-ethylhexyloxyphenol methoxyphenyl triazine is not applicable to a silicone-based external phase due to a solubility problem not applicable to the silicone-based external phase due to the solubility problem, and completed the present invention.

[10]**【Disclosure】****【Technical Problem】**

[11] An embodiment of the present invention is directed to securing a stable formulation including bis-ethylhexyloxyphenol methoxyphenyl triazine to improve a problem that the bis-ethylhexyloxyphenol methoxyphenyl triazine is not applicable to a silicone-based external phase due to a solubility problem. In other words, the embodiment of the present invention is directed to

providing a stable water-in-silicone type cosmetic composition including bis-ethylhexyloxyphenol methoxyphenyl triazine.

[12] Another embodiment of the present invention is directed to providing a water-in-silicone type cosmetic composition capable of imparting synergy with respect to an ultraviolet blocking effect by simultaneously applying an organic UV sunscreen to internal and external phases.

[13] Still another embodiment of the present invention is directed to providing a water-in-silicone type cosmetic composition which is capable of achieving a long-lasting UV blocking effect and preventing skin damage from UV without irritation by improving long-lasting property and water resistance with the improved feeling of close adhesion to skin.

[14]

【Technical Solution】

[15] In one general aspect, there is provided a water-in-silicone type cosmetic composition including: microparticles including bis-ethylhexyloxyphenol methoxyphenyl triazine.

[16] The water-in-silicone type cosmetic composition is a cosmetic composition for UV blocking.

[17] The microparticles may include the bis-ethylhexyloxyphenol methoxyphenyl triazine supported in an

amount of 20% by weight or more based on a total weight of the microparticles.

[18] The microparticles may be hemispherical.

[19] The microparticle may have an average diameter ranging from 1 to 10 μm .

[20] The water-in-silicone type cosmetic composition may further include: a phenylbenzimidazole-based compound and a cyclodextrin-based compound in a water phase.

[21] The composition may include the phenylbenzimidazole-based compound and the cyclodextrin-based compound at a weight ratio of 1 : 0.1 to 1 : 10.

[22] The pH of the composition may be 7.5 or more, and in particular, when the water-in-silicone type cosmetic composition including the phenylbenzimidazole-based compound and the cyclodextrin-based compound has the pH of 7.5 or more, it is possible to achieve improved formulation stability and a boosting effect in SPF.

[23] The composition may satisfy Relational Expression 1 below:

[24] [Relational Expression 1]

[25] $0.1 \leq B/A \leq 1.0$

[26] in Relational Expression 1,

[27] A is an amount (g) of bis-ethylhexyloxyphenol methoxyphenyl triazine used, and

[28] B is an amount (g) of the phenylbenzimidazole-based

compound used.

[29] The composition may include 0 to 1% by weight of a polar oil including at least one polar functional group selected from a carboxyl group (COO), a ketone group (CO), and a hydroxyl group (OH), and the like, based on a total weight of the composition.

[30] The water-in-silicone type cosmetic composition may further include a PEG-added silicone-based surfactant.

[31] The composition may include the bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of 0.1 to 10% by weight based on a total weight of the composition.

[32] The composition may contain an organic UV sunscreen in an amount of 25% by weight or less, the organic UV sunscreen including bis-ethylhexyloxyphenol methoxyphenyl triazine, and a sun protection factor (SPF) of the composition which is calculated by Equation 1 below may be 10 or more:

[33] [Equation 1]

[34]
$$\text{SPF} = (\text{minimum erythema dose (MED) of skin part applied with water-in-silicone type cosmetic composition}) / (\text{MED of skin part not applied with water-in-silicone type cosmetic composition}).$$

[35]

【Advantageous Effects】

[36] According to the present invention, it is possible to secure a stable water-in-silicone type formulation using bis-ethylhexyloxyphenol methoxyphenyl triazine to improve a problem that the bis-ethylhexyloxyphenol methoxyphenyl triazine is not applicable to a silicone formulation due to a solubility problem.

[37] Further, according to the present invention, it is possible to provide a highly stable water-in-silicone type cosmetic composition including bis-ethylhexyloxyphenol methoxyphenyl triazine even though polar oil is not substantially used.

[38] In addition, according to the present invention, it is possible to implement a stable formulation in which an organic sunscreen is stably included in each of the internal water phase and the external oil phase (silicone phase), thereby imparting synergy to the ultraviolet blocking effect, and blocking UV throughout the entire UV wavelength regions (UV-A, UV-B, and UV-C regions).

[39] Further, according to the present invention, it is possible to provide a water-in-silicone type cosmetic composition by introducing silicone to the external oil phase to impart the feelings of lightness and freshness when being used while simultaneously imparting excellent water resistance, to achieve excellent long-lasting property with high close adhesion to the skin, and to

prevent the composition from being smeared after being applied.

[40] In short, according to the present invention, it is possible to provide a water-in-silicone type cosmetic composition for UV blocking having an improved UV blocking effect and excellent water resistance by solving problems regarding solubility of bis-ethylhexyloxyphenol methoxyphenyl triazine and formulation stability.

[41]

【BRIEF DESCRIPTION OF THE DRAWINGS】

[42] FIG. 1(a) is a scanning electron microscope (SEM) image of microparticles of the present invention (scale bar 20 μm).

[43] FIG. 1(b) is a scanning electron microscope (SEM) image of microparticles of the present invention (scale bar 2 μm).

[44] FIG. 2(a) is an image (optical magnification 200) of the microparticles of the present invention dispersed in butylene glycol (BG) observed by an optical microscope.

[45] FIG. 2(b) is an image (polarization magnification 200) of the microparticles of the present invention dispersed in butylene glycol (BG) observed by an optical microscope.

[46] FIG. 2(c) is an image (optical magnification 200) of the microparticles of the present invention dispersed in

phenyl trimethicone observed by an optical microscope.

[47] FIG. 2(d) is an image (polarization magnification 200) of the microparticles of the present invention dispersed in phenyl trimethicone observed by an optical microscope.

[48] FIG. 3(a) is an image (optical magnification 200) of a cosmetic composition of Example 1 of the present invention observed by an optical microscope.

[49] FIG. 3(b) is an image (polarization magnification 200) of a cosmetic composition of Example 1 of the present invention observed by an optical microscope.

[50] FIG. 4(a) is an image (optical magnification 200) of a cosmetic composition of Example 2 of the present invention observed by an optical microscope.

[51] FIG. 4(b) is an image (polarization magnification 200) of a cosmetic composition of Example 2 of the present invention observed by an optical microscope.

[52] FIG. 5(a) is an image (optical magnification 200) of a cosmetic composition of Comparative Example 1 of the present invention observed by an optical microscope.

[53] FIG. 5(b) is an image (polarization magnification 200) of a cosmetic composition of Comparative Example 1 of the present invention observed by an optical microscope.

[54] FIG. 6(a) is an image (optical magnification 200) of a cosmetic composition of Comparative Example 2 of the

present invention observed by an optical microscope.

[55] FIG. 6(b) is an image (polarization magnification 200) of a cosmetic composition of Comparative Example 2 of the present invention observed by an optical microscope.

[56] FIG. 7(a) is an image (optical magnification 200) of a cosmetic composition of Example 3 of the present invention observed by an optical microscope.

[57] FIG. 7(b) is an image (polarization magnification 200) of a cosmetic composition of Example 3 of the present invention observed by an optical microscope.

[58] FIG. 8 illustrates evaluation results regarding the feelings of use when applying each sample of Example 3 and a w/s cream control group as sensory evaluation results according to the present invention.

[59] FIG. 9 illustrates evaluation results regarding the feelings of use after applying each sample of Example 3 and a w/s cream control group as sensory evaluation results according to the present invention.

[60] FIG. 10 illustrates total sensory evaluation results according to the present invention.

[61]

【Best Mode】

[62] Hereinafter, a water-in-silicone type cosmetic composition including an organic sunscreen according to the present invention is described. Unless otherwise defined,

the technical terms and scientific terms used herein have meanings generally understood by those skilled in the art to which the present invention pertains. Known functions and constitutions that may obscure the gist of the present invention with unnecessary detail will be omitted.

[63] As used herein, the term "water-in-silicone type" means an emulsion including a continuous phase of oil in which silicone oil is a main component and a dispersed phase containing water in the continuous phase. In other words, the water-in-silicone type cosmetic composition means an emulsion in which an internal water phase containing water is dispersed on an external oil phase containing the silicone oil.

[64] As used herein, the term "external oil phase" means a continuous phase in which the silicone oil is a main component, and may have the same meaning as an external phase or a silicone phase, and the term "internal water phase" means a dispersed phase including water, and may have the same meaning as the water phase.

[65] As used herein, the term "hydrophilic-lipophilic balance (HLB)" means an indicator of the balance between a hydrophilic group and a lipophilic group of the surfactant. Here, the HLB may be represented by a numerical value of 0 to 20. When the numerical value of the HLB is low, lipophilic characteristic is exhibited and on the contrary,

when the numerical value thereof is high, hydrophilic characteristic is exhibited.

[66]

[67] In general, bis-ethylhexyloxyphenol methoxyphenyl triazine has to be dissolved in an oil, or the like, having a high polarity such as an alkylbenzoate and applied to an oil phase, and the solubility of the silicone-based oil is very low, and thus even if the bis-ethylhexyloxyphenol methoxyphenyl triazine is applied to a formulation in which silicone is an external phase, UV blocking effect is insignificant.

[68] Accordingly, the present inventors have conducted intensified studies on methods capable of solving the problems of the bis-ethylhexyloxyphenol methoxyphenyl triazine (BEMT) which has difficulty in application to formulation due to the solubility problem despite having a high UV blocking effect, thereby applying the BEMT to various forms of formulations.

[69] As a result, the present inventors found that it was possible to provide a water-in-silicone type cosmetic composition capable of solving the above-described problems by using microparticles containing the bis-ethylhexyloxyphenol methoxyphenyl triazine, and at the same time, capable of solving a precipitation problem of the bis-ethylhexyloxyphenol methoxyphenyl triazine while

simultaneously implementing a stable formulation despite of the formulation in which silicone is an external phase, and completed the present invention.

[70] According to the present invention, it is possible to provide a water-in-silicone type cosmetic composition capable of uniformly dispersing the bis-ethylhexyloxyphenol methoxyphenyl triazine in a formulation and providing an SPF boosting effect by effectively scattering UVs.

[71] Meanwhile, in conventional emulsified formulations, it is difficult to include all of the feelings of lightness and non-stickiness when being used, and reduced residual feeling and thickness feeling with excellent close adhesion at the same time. However, it should be noted that the water-in-silicone type cosmetic composition according to the present invention is a formulation having an optimal formulation capable of simultaneously providing the above-described feelings when being used, which provides the feeling on use differentiated from that of the conventional emulsion formulations.

[72] In other words, the present invention provides a novel form of formulation in which the bis-ethylhexyloxyphenol methoxyphenyl triazine is stably usable in various silicone formulations.

[73]

[74] Hereinafter, the constitution of the present

invention is described in detail.

[75] The water-in-silicone type cosmetic composition according to an embodiment of the present invention may include microparticles including the bis-ethylhexyloxyphenol methoxyphenyl triazine.

[76] Even though the bis-ethylhexyloxyphenol methoxyphenyl triazine having a very low solubility to silicone oil is used, the water-in-silicone type cosmetic composition according to an embodiment of the present invention may effectively inhibit phenomenon in which the bis-ethylhexyloxyphenol methoxyphenyl triazine is precipitated as crystals on surfaces of the microparticles, on the external phase of the composition, or the like, thereby solving the solubility problem of the bis-ethylhexyloxyphenol methoxyphenyl triazine.

[77] Specifically, in the water-in-silicone type cosmetic composition according to an embodiment of the present invention, the microparticles may include the bis-ethylhexyloxyphenol methoxyphenyl triazine supported in an amount of 20% by weight or more based on a total weight of the microparticles. Here, the microparticles may include the bis-ethylhexyloxyphenol methoxyphenyl triazine alone in the particles.

[78] Even though the microparticles include the bis-ethylhexyloxyphenol methoxyphenyl triazine in the above-

described amount, the microparticles may have excellent light stability and may be stably dispersed in the silicone external phase, thereby implementing excellent UV blocking effect.

[79] More specifically, the microparticles may have a hemispherical particle shape.

[80] It should be noted that the water-in-silicone type cosmetic composition according to an embodiment of the present invention includes microparticles having a hemispherical particle shape, thereby providing the feeling on use differentiated from that of the spherical microparticles, imparting excellent long-lasting property due to improved close adhesion, and exerting remarkable sebum absorption ability due to remarkable oil absorption and total intrusion volume.

[81] In addition, in the water-in-silicone type cosmetic composition according to an embodiment of the present invention, the microparticle may have an average diameter ranging from 1 to 10 μm , but the average diameter is not limited thereto. Here, when the hemispherical microparticles are employed, it is possible to provide the feeling on use which is differentiated from a case where spherical microparticles are employed, and to impart excellent long-lasting property with high close adhesion, thereby enhancing the UV blocking effect.

[82] For example, from the viewpoint that it is possible to stably disperse the microparticles in the silicone external phase and to achieve excellent close adhesion, the microparticles may preferably have an average diameter ranging from 1 to 8 μm , more preferably an average diameter ranging from 2 to 6 μm , but the average diameter is not limited thereto.

[83] In the water-in-silicone type cosmetic composition according to an embodiment of the present invention, the microparticles may include the bis-ethylhexyloxyphenol methoxyphenyl triazine homogeneously contained in an internal matrix of the polymer particles. Here, the homogeneity may mean that the bis-ethylhexyloxyphenol methoxyphenyl triazine is uniformly mixed in the polymer matrix in a molecular manner.

[84] For example, the microparticles may be produced by dispersion-polymerization using an oil phase simultaneously including the bis-ethylhexyloxyphenol methoxyphenyl triazine, a polymerizable monomer, and a polyfunctional cross-linking monomer. In other words, the microparticles may be provided so that the bis-ethylhexyloxyphenol methoxyphenyl triazine is homogeneously included in the internal matrix of the polymer particles.

[85] For example, the microparticles may be hemispherical particles.

[86] The present inventors found that when the dispersion polymerization is performed to produce the microparticles including the bis-ethylhexyloxyphenol methoxyphenyl triazine as the organic sunscreen alone, it was possible to specifically implement the hemispherical shape according to the amount of bis-ethylhexyloxyphenol methoxyphenyl triazine used. Here, the microparticles may include 20% by weight or more of bis-ethylhexyloxyphenol methoxyphenyl triazine as described above. The microparticles produced by the dispersion polymerization may include the bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of 24 to 30% by weight, and more specifically 24.5 to 28.5% by weight.

[87] When the above-described range is satisfied, the hemispherical microparticles may be formed to promote improvement of the desired effects, but the present invention is not limited thereto.

[88] Further, in the microparticles produced by the dispersion polymerization, the polyfunctional cross-linking monomer may be used in an amount of 0.1 to 100 parts by weight based on 100 parts by weight of the polymerizable monomer, and the amount of the polyfunctional cross-linking monomer used may be changed depending on the degree of cross-linking according to the purpose, and the amount of bis-ethylhexyloxyphenol methoxyphenyl triazine used may be

appropriately controlled according to a particle shape to be implemented.

[89] For example, the polyfunctional cross-linking monomer may be used, specifically, in an amount of 1 to 50 parts by weight, more specifically 1 to 25 parts by weight, based on 100 parts by weight of the polymerizable monomer, but the amount thereof is not limited thereto.

[90] The polymerizable monomer is not limited as long as it is a radically polymerizable monomer capable of copolymerizing with the polyfunctional cross-linking monomer to described below, and specifically, may be a radically polymerizable monomer including one ethylene group. Examples of the polymerizable monomer may include aromatic vinyl monomers such as styrene, methylstyrene, ethylstyrene, fluorostyrene, chlorostyrene, vinyltoluene, and the like; acrylic vinyl monomers such as methyl (meth)acrylate, ethyl (meth)acrylate, butyl (meth)acrylate, octyl (meth)acrylate, stearyl (meth)acrylate, benzyl (meth)acrylate, glycidyl (meth)acrylate, and the like. Further, in the present invention, one or two or more radically polymerizable monomers described above may be used.

[91] The polyfunctional cross-linking monomer is not limited as long as it is a monomer capable of cross-linking the polymerizable monomer, and specifically, may be a

cross-linking monomer including two or more ethylene groups. Examples of the polyfunctional cross-linking monomer may include divinylbenzene, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate, triethylene glycol dimethacrylate, trimethylene propane trimethacrylate, 1,3-butanediol dimethacrylate, 1,6-hexanediol dimethacrylate, tri(meth)acrylate, and the like. Further, in the present invention, one or two or more polyfunctional cross-linking monomers described above may be used.

[92] Further, the water-in-silicone type cosmetic composition according to an embodiment of the present invention may include the microparticles in an amount of 1 to 35% by weight, specifically 5 to 30% by weight, and more specifically, 5 to 15% by weight, based on the total weight of the composition.

[93] In other words, the water-in-silicone type cosmetic composition may include the bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of up to 10% by weight based on the total weight of the composition.

[94] The water-in-silicone type cosmetic composition according to an embodiment of the present invention may further include: a phenylbenzimidazole-based compound and a cyclodextrin-based compound in a water phase.

[95] The phenylbenzimidazole-based compound is one of the organic sunscreens included in the water phase. In a

general O/W formulation, the pH of the formulation is adjusted to an appropriate range, thereby inhibiting crystal precipitation. On the other hand, in a W/S formulation which is based on silicone, the phenylbenzimidazole-based compound is precipitated, and thus it is difficult to apply the formulation to the water phase.

[96] Despite these characteristics, it is confirmed that the water-in-silicone type cosmetic composition according to an embodiment of the present invention may effectively inhibit the problem thereof (for example, crystal precipitation) by using a combination of microparticles and phenylbenzimidazole-based compound as described above. In addition, by using the cyclodextrin-based compound simultaneously, the crystal precipitation may be more effectively inhibited, and even if the phenylbenzimidazole-based compound is partially crystal-precipitated in the water phase, the cyclodextrin-based compound may assist the phenylbenzimidazole-based compound to be stably re-dissolved in the water phase.

[97] For example, the phenylbenzimidazole-based compound and the cyclodextrin-based compound may be included in a weight ratio of 1 : 0.1 to 1 : 10.

[98] For example, the phenylbenzimidazole-based compound and the cyclodextrin-based compound may be specifically

included in a weight ratio of 1 : 1 to 1 : 2, and more specifically, 1 : 1.5 to 1 : 2. It is preferable to satisfy the above-described weight ratio from the viewpoint that it is possible to implement more improved formulation stability.

[99] For example, in order to ensure a more stable formulation, the pH of the composition may be 7.5 or more, specifically 7.5 to 9, and more specifically 7.5 to 8.5.

[100] For example, it is preferable that the composition satisfies the above-described weight ratio of the phenylbenzimidazole-based compound and the cyclodextrin-based compound while simultaneously satisfying the pH ranging from 7.5 or more, from the viewpoint that it is possible to inhibit the crystal precipitation of the phenylbenzimidazole-based compound and to promote the improved formulation stability.

[101] The phenylbenzimidazole-based compound is one of water-soluble organic UV sunscreen, and examples of the phenylbenzimidazole-based compound may include phenylbenzimidazole sulfonic acid, potassium phenylbenzimidazole sulfonate, sodium phenylbenzimidazole sulfonate, TEA-phenylbenzimidazole sulfonate, and the like. Further, in the present invention, one or two or more phenylbenzimidazole-based compounds described above may be used, but the present invention is not limited thereto.

[102] Here, in the water-in-silicone type cosmetic composition according to an embodiment of the present invention, the phenylbenzimidazole-based compound may be included in an amount of 0.1 to 10% by weight, specifically 0.5 to 4.5% by weight, and more specifically, 0.5 to 2.5% by weight, based on the total weight of the composition, but the amount of the phenylbenzimidazole-based compound is not limited thereto.

[103] The cyclodextrin-based compound is provided to prevent crystal precipitation of the phenylbenzimidazole-based compound and provide improved formulation stability. Examples of the cyclodextrin-based compound may include alpha-cyclodextrin, beta-cyclodextrin, gamma-cyclodextrin, hydroxypropyl beta-cyclodextrin, carboxymethyl cyclodextrin, methyl carboxymethyl cyclodextrin, aminocyclodextrin, branched cyclodextrin to which glucose is added, and a cyclodextrin polymer, and the like. Further, in the present invention, one or two or more cyclodextrin-based compounds described above may be used, but the present invention is not limited thereto.

[104] As described above, in the water-in-silicone type cosmetic composition according to an embodiment of the present invention, the phenylbenzimidazole-based compound and the cyclodextrin-based compound are included in the water phase. Here, the cyclodextrin-based compound serves

to effectively inhibit the crystal precipitation of the phenylbenzimidazole-based compound included in the water phase. When the cyclodextrin-based compound satisfies a predetermined weight ratio and satisfies an appropriate pH range of the composition, it is possible to completely inhibit the crystal precipitation of the phenylbenzimidazole-based compound and to provide a more stable formulation.

[105] In the water-in-silicone type cosmetic composition according to an embodiment of the present invention, amounts of the bis-ethylhexyloxyphenol methoxyphenyl triazine and the phenylbenzimidazole-based compound used may satisfy Relational Expression 1 below:

[106] [Relational Expression 1]

[107] $0.1 \leq B/A \leq 1.0$

[108] in Relational Expression 1,

[109] A is an amount (g) of bis-ethylhexyloxyphenol methoxyphenyl triazine used, and

[110] B is an amount (g) of the phenylbenzimidazole-based compound used.

[111] When the Relational Expression 1 is satisfied, it is possible to provide a synergistic effect on the sun protection factor (SPF) of the composition. Specifically, a ratio (B/A) of the amounts of the bis-ethylhexyloxyphenol methoxyphenyl triazine and the phenylbenzimidazole-based

compound used may satisfy 0.3 to 0.8. When the Relational Expression is satisfied, it is possible to implement the UV blocking effect throughout the entire UV wavelength regions (UV-A, UV-B, and UV-C regions) by simultaneously introducing the organic sunscreen (i.e., bis-ethylhexyloxyphenol methoxyphenyl triazine and phenylbenzimidazole-based compound) stably dispersed and dissolved in both the internal water phase and the external oil phase of the formulation.

[112] In addition, the water-in-silicone type cosmetic composition according to an embodiment of the present invention is characterized in that a polar oil for dissolving bis-ethylhexyloxyphenol methoxyphenyl triazine is not substantially included or a trace amount thereof is included.

[113] In other words, according to the present invention, even though the polar oil is not included or a trace amount of polar oil is used, it is possible to provide a highly stable water-in-silicone type cosmetic composition while overcoming the solubility of bis-ethylhexyloxyphenol methoxyphenyl triazine.

[114] For example, the polar oil includes at least one polar functional group selected from a carboxyl group (COO), a ketone group (CO) and a hydroxyl group (OH). Examples of the polar oil may include cetyl ethylhexanoate, octyl

dodecyl myristate, di-C12-13 alkyl maleate, pentaerythrityl tetraisostearate, pentaerythrityl tetraethylhexanoate, diisostearyl maleate, isopropyl palmitate, C12-15 alkyl benzoate, dicaprylic carbonate, dicaprylic ether, 2-octyldodecanol, and the like.

[115] For example, the polar oil may be included in an amount of 0 to 1% by weight, specifically 0 to 0.5% by weight, and more specifically 0 to 0.1% by weight, based on the total weight of the composition, but the amount of the polar oil is not limited thereto.

[116] In addition, in the water-in-silicone type cosmetic composition according to an embodiment of the present invention, it is preferable to use a PEG-added silicone-based surfactant from the viewpoint that the microparticles including bis-ethylhexyloxyphenol methoxyphenyl triazine are stably dispersed while simultaneously preventing bis-ethylhexyloxyphenol methoxyphenyl triazine precipitated as crystals on the interface.

[117] Examples of the PEG-added silicone-based surfactant may include cyclopentasiloxane and PEG/PPG-18/18 dimethicone, PEG-30 dipolyhydroxystearate, PEG-7 dimethicone, PEG-10 dimethicone, cyclopentasiloxane/PEG.PPG-19.19 dimethicone, sorbitan isostearate, lauryl PEG.PPG-18.18 methicone, cetyl PEG.PPG-10.1 dimethicone, lauryl PEG-9 polydimethylsiloxylethyl

dimethicone, and the like. Further, in the present invention, one or two or more PEG-added silicone-based surfactants exemplified above may be used, but the present invention is not limited thereto.

[118] More specifically, the PEG-added silicone-based surfactant may be a nonionic surfactant having a hydrophilic-lipophilic balance (HLB) of 1 to 6.

[119] Here, in the water-in-silicone type cosmetic composition according to an embodiment of the present invention, the amount of the PEG-added silicone-based surfactant used may be appropriately adjusted depending on the type and content of the silicone-based oil.

[120] For example, the PEG-added silicone-based surfactant may be used in an amount of 1 to 10% by weight, specifically 1 to 8% by weight, and more specifically 3 to 6% by weight based on the total weight of the composition, but the amount of the PEG-added silicone-based surfactant is not limited thereto.

[121] Further, the water-in-silicone type cosmetic composition according to an embodiment of the present invention may include the bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of 1 to 4.5% by weight, specifically 1 to 4% by weight, and more specifically, 1.5 to 3.5% by weight, based on the total weight of the composition.

[122] Further, the water-in-silicone type cosmetic composition according to an embodiment of the present invention may contain an organic sunscreen including the bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of 25% by weight or less, and a sun protection factor (SPF) of the composition which is calculated by Equation 1 below may be 10 or more:

[123] [Equation 1]

[124]
$$\text{SPF} = \frac{\text{(minimum erythema dose (MED) of skin part applied with water-in-silicone type cosmetic composition)}}{\text{(MED of skin part not applied with water-in-silicone type cosmetic composition)}}$$

[125] For example, the water-in-silicone type cosmetic composition according to an embodiment of the present invention includes the bis-ethylhexyloxyphenol methoxyphenyl triazine up to in an amount of 4.5% by weight, and contains the organic sunscreen including the bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of 25% by weight or less, wherein the SPF of the composition calculated by Equation 1 above may be 10 to 50, specifically, 20 to 50, and more specifically, 30 to 50.

[126] The water-in-silicone type cosmetic composition according to an embodiment of the present invention includes one or two or more silicone-based oils selected from dimethicone, cyclomethicone, phenyltrimethicone,

polydimethylsiloxane, methylphenylpolysiloxane, methylcyclopolysiloxane, octamethylcyclotetrasiloxane, decamethylcyclopentasiloxane, dodecamethylcyclohexasiloxane, tetradecamethylhexasiloxane, octamethyltrisiloxane, and the like.

[127] For example, the silicone-based oil may be included in an amount of 15 to 60% by weight, specifically 15 to 50% by weight, and more specifically 20 to 40% by weight, based on the total weight of the composition, but the amount of the silicone-based oil is not limited thereto.

[128] For example, the composition includes residual amount of water.

[129] In addition, the water-in-silicone type cosmetic composition according to an embodiment of the present invention may further include an organic sunscreen and an inorganic sunscreen depending on the purpose, and may further include at least one additive selected from a moisturizing component, a thickener, a pH adjuster, an anti-discoloration agent, pigment, fragrance, an antiseptic, and a soothing promoter, and the like. Here, the organic sunscreen, the inorganic sunscreen and the additives may be included in an amount of 0.01 to 20% by weight, respectively, based on the total weight of the composition, but the present invention is not limited thereto.

[130]

[131] Hereinafter, the water-in-silicone type cosmetic composition including the organic sunscreen according to an embodiment of the present invention is described in more detail through the following Examples. It should be understood, however, that the following Examples are only illustrative of the present invention in detail, and the present invention is not limited thereto, and may be implemented in various forms. In addition, components that are not specifically described in the specification may be expressed in the unit of gram (g) or % by weight based on the total composition.

[132] (Evaluation method)

[133] 1. Evaluation of sun protection factor (SPF)

[134] An amount of ultraviolet light emitted from a solar simulator lamp to a test area was adjusted to 20 to 100 mJ/cm² and the UV was irradiated onto the back of the subject. The minimal erythema dose (MED) was confirmed after 24 hours of UV irradiation.

[135] In order to confirm the UV blocking effect of each sample (Examples and Comparative Examples), the back of the subject was uniformly applied with 0.1 g of the sample at a thickness of 2 μ l/cm², left to stand for 15 minutes, and dried. A UV irradiation window was attached and fixed to each sample application site, and UV irradiation was performed while UV blocking other portions except for the

irradiation window using leather and a towel.

[136] An UV irradiation dose was examined based on the MED (SPF 50) of the subject and the test was conducted by gradually increasing the UV irradiation dose. After 24 hours of UV irradiation, the minimum erythema dose was judged, and the UV blocking effect was calculated according to Equation 1 below. Results thereof are shown in Table 2 below.

[137] [Equation 1]

[138]
$$\text{SPF} = \frac{(\text{minimum erythema dose (MED) of skin part applied with water-in-silicone type cosmetic composition})}{(\text{MED of skin part not applied with water-in-silicone type cosmetic composition})}$$

[139] 2. Sensory evaluation

[140] The sensory evaluation of each sample (Example) was evaluated with the feelings of use when application and after application. The sensory evaluation was performed by a general questionnaire survey method with five men and five women participating in the evaluation, and results thereof are shown in FIG. 8 to FIG. 10. In the sensory evaluation, the w/s cream prepared using the components shown in Table 3 below was used as a control group, and the questionnaire survey was confirmed by a 10-point scale (-5 to 5 points).

[141] 3. Skin safety evaluation

[142] In order to confirm the skin safety of each sample (Examples), a patch test of each sample (Example) was performed. Specifically, the right and left forearms of each panel (each male and female) were washed with soap, and the skin of each panel was adapted at a temperature of about 20°C and a humidity of about 40%. The test area is two square areas with a size of 4 x 3 cm² on the left and right inner side surfaces of the forearms, a patch applied with each sample was attached thereonto, the patch was removed after 28 hours. The first reading was performed after 30 minutes of attaching the patch, and the second reading was performed after 96 hours of attaching the patch. In order to determine the intensity of skin irritation of each sample, the average skin response degree was calculated by providing a weighted value according to the degree of positive skin reaction, and the skin irritation of each sample was visually judged. Results thereof are shown in Table 5 below. Here, the judgment criteria was judged by a 5-point scale, and the average skin response degree was calculated according to Equation 2 below (Judgment criteria: less than 1 point (Grade I): No irritation, 1 or more to less than 3 points (Grade II): Light irritation, 3 points or more to less than 5 points (Grade III): Moderate irritation, 5 points or more (Grade IV): Intensive irritation).

[143] [Equation 2]

[144]

$$\text{Average Skin Response Degree} = \frac{\sum \text{Grade} \times \text{Respondents} \times 100}{4 \text{ (Maximum Rating)} \times n \text{ (Total Number of People)} \times 2 \text{ (Judgment Criteria Score)}}$$

[145]

[146] (Preparation Example 1)

[147] To a reaction tank, 9 g of polyvinyl alcohol was added and dissolved in 2,000 g of distilled water to prepare a water phase.

[148] To an emulsifying machine 200 g of methyl methacrylate (MMA) and 25 g of ethyleneglycol dimethacrylate were added and stirred for 5 minutes. 75 g of bis-ethylhexyloxyphenol methoxyphenyl triazine (BEMT) was further added thereto and dissolved for 30 minutes, thereby preparing an oil phase. Then, 3 g of 2,2'-azobis-(2,4-dimethylvaleronitrile) as an initiator was added and mixed.

[149] Then, the water phase was added to the emulsifying machine, then the resultant mixture was subjected to dispersion polymerization for 30 minutes using the emulsifying machine, and reacted at 50°C for 15 hours by raising the temperature.

[150] The obtained polydispersed microparticles were dehydrated using a decompression filter, washed 3 times

with water, followed by vacuum drying, thereby obtaining final hemispherical microparticles including 25% by weight of bis-ethylhexyloxyphenol methoxyphenyl triazine (yield = 90%, average diameter of microparticles = 2 μm , see FIG. 1).

[151] The hemispherical microparticles obtained by the above-described method were used to measure the oil absorption (measured in the inside controlled at room temperature (23°C) in accordance with JIS K 5101-13-1: measurement method of oil absorption of substrate).

[152] As a result, it could be confirmed that the hemispherical microparticles obtained by the above-described method had an oil absorption of 0.888 ml/g and a total intrusion volume of 1.37 ml/g. These values correspond to the oil absorption of 150% or more and the total intrusion volume of 210% or more as compared to those of the conventional PMMA spherical particles.

[153] Further, the hemispherical microparticles obtained by the above-described method could be stably dispersed in polyol (for example, butylene glycol) or silicone-based oil (for example, phenyl trimethicone), and the precipitation of the bis-ethylhexyloxyphenol methoxyphenyl triazine was not found while storing (see FIG. 2).

[154]

[155] (Preparation Example 2)

[156] The final spherical microparticles including 28% by

weight of bis-ethylhexyloxyphenol methoxyphenyl triazine (yield = 92%, average diameter of microparticles = 2.2 μm) were obtained in the same manner except that 205.4 g of methyl methacrylate (MMA), 25.6 g of ethylene glycol dimethacrylate, and 69 g of bis-ethylhexyloxyphenol methoxyphenyl triazine (BEMT) were used in the method of Preparation Example 1.

[157]

[158] (Examples 1 to 6)

[159] Each water-in-silicone type cosmetic composition was prepared with the composition shown in Table 1 below.

[160] Specifically, the components of the oil phase part were mixed, uniformly dispersed, and dissolved. The components of the water phase part were mixed, dissolved, and added to the heated components of the oil phase part, then each resulting mixture was emulsified using a homogenizer to prepare each water-in-silicone type cosmetic composition.

[161]

[162] (Comparative Examples 1 and 2)

[163] Each water-in-silicone type cosmetic composition was prepared by using the composition shown in Table 2 below and performing the same method as in the Examples above.

[164] (Table 1)

Classif ication	Name of Raw Materials	Example					
		1	2	3	4	5	6
SPF #, PA++		25	35	–	40	–	–
Oil phase part	Dimethicone	5	5	5	5	5	5
	Ethylhexylmethoxycinnamate *BHT	3	5	5	5	5	5
	Ethylhexyl salicylate	2	3	3	3	3	3
	Trisiloxane * Dimethicone	4	4	4	4	4	4
	Cyclomethicone *						
	Dimethicone / Vinyl Dimethicone crosspolymer	2	2	2	2	2	2
	Disteardimonium Hectorite	1. 3	1. 3	1. 3	1. 3	1. 3	1. 3
	Tocopherol * Lauryl PEG-9 polydimethylsiloxyethyl dimethicone	2. 5	2. 5	2. 5	2. 5	2. 5	2. 5
	Titanium dioxide * Aluminum hydroxide * Stearic acid	1. 2	1. 2	1. 2	1. 2	1. 2	1. 2
	Dimethicone * Trisiloxane	10	10	10	10	10	10
	C12-15 Alkyl benzoate *						
	Titanium dioxide * Aluminum stearate * Polyhydroxystearic acid *	8	8	8	8	8	8

	Alumina						
	PEG-10 Dimethicone	3	3	3	3	3	3
	Preparation Example 1_Microcapsule (BEMT 25%)	10	12	12	12	12	12
	Bis-ethylhexyloxyphenol methoxyphenyl triazine	-	-	-	-	-	-
Water phase part	Phenylbenzimidazole sulfonic acid (PBSA)	-	-	2. 0	2. 5	2. 0	2. 0
	Tromethamine	-	-	1. 9	2. 4	1. 9	1. 9
	HP-b-cyclodextrin	-	-	4. 0	5. 0	1. 9	4. 1
	2Na EDTA	0. 05	0. 05	0. 05	0. 05	0. 05	0. 05
	Sodium chloride	0. 5	0. 5	0. 5	0. 5	0. 5	0. 5
	Glycerin	2. 0	2. 0	2. 0	2. 0	2. 0	2. 0
	Propanediol	3. 0	3. 0	3. 0	3. 0	3. 0	3. 0
	Glyceryl caprylate	0. 1	0. 1	0. 1	0. 1	0. 1	0. 1
	Tocopherol * Ethylhexyl glycerin	0. 05	0. 05	0. 05	0. 05	0. 05	0. 05

	Water	Residual amount
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[165] (Table 2)

Classification	Name of Raw Materials	Comparative Example	
		1	2
SPF #, PA++		-	-
Oil phase part	Dimethicone	5	5
	Ethylhexylmethoxycinnamate *BHT	3	3
	Ethylhexyl salicylate	2	2
	Trisiloxane * Dimethicone	4	4
	Cyclomethicone * Dimethicone / Vinyl Dimethicone crosspolymer	2	2
	Disteardimonium Hectorite	1.3	1.3
	Tocopherol * Lauryl PEG-9 polydimethylsiloxyethyl dimethicone	2.5	2.5
	Titanium dioxide * Aluminum hydroxide * Stearic acid	1.2	1.2
	Dimethicone * Trisiloxane	10	10
	C12-15 Alkyl benzoate * Titanium dioxide * Aluminum stearate * Polyhydroxystearic acid * Alumina	8	8
	PEG-10 Dimethicone	3	3

	Preparation Example 1_Microcapsule (BEMT 25%)	10	-
	Bis-ethylhexyloxyphenol methoxyphenyl triazine	-	2.5
Water phase part	Phenylbenzimidazole sulfonic acid (PBSA)	2.0	-
	Tromethamine	1.9	-
	HP-b-cyclodextrin	-	-
	2Na EDTA	0.05	0.05
	Sodium chloride	0.5	0.5
	Glycerin	2.0	2.0
	Propanediol	3.0	3.0
	Glyceryl caprylate	0.1	0.1
	Tocopherol * Ethylhexyl glycerin	0.05	0.05
	Water	Residual amount	

[166] (Table 3)

Classi ficati on	Name of Raw Materials	Control Group
Oil phase part	Wax	1.5
	Ester-based oil	10
	Ethylhexylmethoxycinnamate * BHT	6.5
	W/O Emulsifier	7

	Cyclomethicone	12
	Silicone elastomer	2
	Disteardimonium hectorite	1.2
	Pigment + Powder	10
Water phase part	Distilled water	To 100
	Polyol	6
	Sodium chloride	1
	2Na EDTA	0.05
	Antiseptic	0.2
	Extract	1.5

[167] (Table 4)

	Average Skin Response Degree	Judgment Grade
Example 1	0.11	Grade I
Example 2	0.32	Grade I

[168] It was confirmed that in the water-in-silicone type cosmetic composition according to the present invention, the problem of bis-ethylhexyloxyphenol methoxyphenyl triazine in which the crystal precipitation occurred due to the solubility problem could be solved.

[169] Specifically, as shown in FIG. 3 and FIG. 4 below, it was confirmed that in the water-in-silicone type cosmetic composition according to the present invention, very stable

formulation could be maintained without the crystal precipitation of the phenylbenzimidazole-based compound and bis-ethylhexyloxyphenol methoxyphenyl triazine when observing the composition by optical microscope and polarizing microscope.

[170] Further, as shown in FIG. 7 below, the water-in-silicone type cosmetic composition according to the present invention could impart synergy to the SPF together with the UV blocking effect throughout the entire UV wavelength regions by the combination of the phenylbenzimidazole-based compound, which is one of the organic sunscreen applied to the water phase. In particular, it was confirmed that according to the combination, the phenylbenzimidazole-based compound applied to water phase was capable of being applied to a formulation more stably without causing precipitation.

[171] On the other hand, as shown in FIG. 5 below, in Comparative Example 1, the phenomenon in which the bis-ethylhexyloxyphenol methoxyphenyl triazine was precipitated as crystals immediately after the formulation was prepared, was confirmed. Further, as shown in FIG. 6 below, in Comparative Example 2, the phenomenon in which the phenylbenzimidazole-based compound applied to the water phase was precipitated as crystals could be observed with a polarizing microscope.

[172] Meanwhile, as a result of the sensory evaluation, it could be confirmed that the water-in-silicone cosmetic composition according to the present invention was a formulation capable of simultaneously providing the feelings of lightness and non-stickiness when being used, and the residual feeling and thickness feeling with excellent close adhesion.

[173] Specifically, as shown in FIG. 8 to FIG. 10 below, the water-in-silicone cosmetic composition according to the present invention provides the close adhesion with an appropriate thickness feeling while imparting the feeling of softness without stickiness when being applied to the skin. In addition, silkiness and softness are provided even after application, and simultaneously, the residual feeling and oiliness are lowered, thereby increasing favorability of the feeling on use. These feelings of use has an obvious contrast with the result obtained when the commercially available w/s cream is used as a control group, which means that the favorability for the feeling on use of the present invention is higher than that of the control group.

[174] Further, as shown in Table 4, it was confirmed that the water-in-silicone type cosmetic composition according to the present invention was capable of being safely used since there was no irritation to the skin.

[175]

[176] Hereinabove, although the present invention is described by specific matters, limited Examples, and drawings, they are provided only for assisting in the entire understanding of the present invention. Therefore, the present invention is not limited to the exemplary embodiments. Various modifications and changes may be made by those skilled in the art to which the present invention pertains from this description.

[177] Therefore, the spirit of the present invention should not be limited to the above-described exemplary embodiments, and the following claims as well as all modified equally or equivalently to the claims are intended to fall within the scope and spirit of the invention.

【CLAIMS】**【Claim 1】**

A water-in-silicone type cosmetic composition comprising:

microparticles including bis-ethylhexyloxyphenol methoxyphenyl triazine; and

a phenylbenzimidazole-based compound and a cyclodextrin-based compound in a water phase.

【Claim 2】

The water-in-silicone type cosmetic composition of claim 1, wherein the microparticles include the bis-ethylhexyloxyphenol methoxyphenyl triazine supported in an amount of 20% by weight or more based on a total weight of the microparticles.

【Claim 3】

The water-in-silicone type cosmetic composition of claim 2, wherein the microparticles are hemispherical.

【Claim 4】

The water-in-silicone type cosmetic composition of claim 1, wherein the microparticle has an average diameter ranging from 1 to 10 μm .

【Claim 5】

The water-in-silicone type cosmetic composition of claim 1, wherein the composition includes the phenylbenzimidazole-based compound and the cyclodextrin-based compound at a weight ratio of 1 : 0.1 to 1 : 10.

【Claim 6】

The water-in-silicone type cosmetic composition of claim 1, wherein the pH of the composition is 7.5 or more.

【Claim 7】

The water-in-silicone type cosmetic composition of claim 1, wherein the composition satisfies Relational Expression 1 below:

[Relational Expression 1]

$$0.1 \leq B/A \leq 1.0$$

in Relational Expression 1,

A is an amount (g) of the bis-ethylhexyloxyphenol methoxyphenyl triazine used, and

B is an amount (g) of the phenylbenzimidazole-based compound used.

【Claim 8】

The water-in-silicone type cosmetic composition of claim 1, wherein the composition includes 0 to 1% by weight

of a polar oil including at least one polar functional group selected from a carboxyl group (COO), a ketone group (CO), and a hydroxyl group (OH), based on a total weight of the composition.

【Claim 9】

The water-in-silicone type cosmetic composition of claim 1, further comprising:

a PEG-added silicone-based surfactant.

【Claim 10】

The water-in-silicone type cosmetic composition of any one of claims 1 to 9, wherein the composition is used for UV blocking.

【Claim 11】

The water-in-silicone type cosmetic composition of any one of claims 1 to 9, wherein the composition includes the bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of 0.1 to 10% by weight based on a total weight of the composition.

【Claim 12】

The water-in-silicone type cosmetic composition of claim 11, wherein the composition contains an organic UV

sunscreen in an amount of 25% by weight or less based on the total weight of the composition, and a sun protection factor (SPF) of the composition which is calculated by Equation 1 below is 10 or more:

[Equation 1]

$$\text{SPF} = (\text{minimum erythema dose (MED) of skin part applied with water-in-silicone type cosmetic composition}) / (\text{MED of skin part not applied with water-in-silicone type cosmetic composition}).$$