



(51) International Patent Classification:

A61K 8/02 (2006.01) *A61K 8/31* (2006.01)
A61K 8/04 (2006.01) *A61K 8/891* (2006.01)
A61K 8/11 (2006.01) *A61Q 1/02* (2006.01)
A61K 8/24 (2006.01) *A61Q 1/12* (2006.01)
A61K 8/25 (2006.01)

(21) International Application Number:

PCT/JP2009/071358

(22) International Filing Date:

16 December 2009 (16.12.2009)

(25) Filing Language:

English

(26) Publication Language:

English

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

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

Published:

— with international search report (Art. 21(3))

(54) Title: POWDERY COSMETIC COMPOSITION

(57) Abstract: The present invention relates a powdery cosmetic composition in the form of a compacted powder comprising: at least one spherical filler in an amount of 10wt% or more based on the total weight of the composition; and two non-spherical fillers with different average particle sizes wherein the non-spherical filler with a smaller average particle size has been surface treated with a surface treatment agent comprising a silicone oil, and the non-spherical filler with a larger average particle size has been surface-treated with a surface treatment agent comprising at least one non-silicone oil; the ratio of the amount of the non-spherical filler with a smaller average particle size to the amount of the non-spherical filler with a larger average particle size is 1 or more; and the ratio of the total amount of the two non-spherical fillers to the amount of the spherical filler is 1 or more. The powdery cosmetic composition according to the present invention can have good compactability as well as good cosmetic properties even though it comprises a relatively large amount of spherical fillers.



DESCRIPTION

POWDERY COSMETIC COMPOSITION

TECHNICAL FIELD

The present invention relates to a powdery cosmetic composition in the form of a compacted powder.

BACKGROUND ART

Skin make up compositions may commonly be used to give an attractive color to the skin, such as the face, but also to mask skin imperfections, such as redness, marks and wrinkles.

Certain makeup compositions may be in the form of compacted powders. These compositions generally comprise a high content of powders, for example, at least about 70% by weight of powders, relative to the total weight of the composition. For example, please refer to US-A-2005-276776.

DISCLOSURE OF INVENTION

Depending on the type of powders used, the cosmetic properties of the makeup compositions may be very variable.

For example, if a relatively large amount of spherical filler(s) is in a powdery cosmetic composition in the form of a compacted powder, the compactability of the composition deteriorates, and some aspects of the cosmetic properties of the composition such as adhesion to the skin also deteriorate.

Thus, an objective of the present invention is to provide good compactability to a powdery cosmetic composition in the form of a compacted powder as well as good cosmetic properties to the powdery cosmetic composition even if it comprises a relatively large amount of spherical fillers.

The above objective of the present invention can be achieved by a powdery cosmetic composition in the form of a compacted powder comprising:

at least one spherical filler in an amount of 10wt% or more based on the total weight of the composition; and

two non-spherical fillers with different average particle sizes wherein

the non-spherical filler with a smaller average particle size has been surface treated with a surface treatment agent comprising a silicone oil, and the non-spherical filler with a larger average particle size has been surface-treated with a surface treatment agent comprising at least one non-silicone oil;

the ratio of the amount of the non-spherical filler with a smaller

average particle size to the amount of the non-spherical filler with a larger average particle size is 1 or more; and the ratio of the total amount of the two non-spherical fillers to the amount of the spherical fillers is 1 or more.

The average particle size of the non-spherical filler with a smaller average particle size may be less than 6 μ m, whereas the average particle size of the non-spherical filler with a larger average particle size may be 6 μ m or more and 10 μ m or less.

The ratio of the amount of the non-spherical filler with a smaller average particle size to the amount of the non-spherical filler with a larger average particle size may be 2 or more, preferably 3 or more.

The ratio of the total amount of the two non-spherical fillers to the amount of the spherical filler may be 2 or more, preferably 3 or more.

The non-silicone oil may be a hydrogenated oil.

The two non-spherical fillers may be independently selected from the group consisting of talc, mica, silica, kaolin, sericite, calcinated talc, calcinated mica, calcinated sericite, synthetic mica, lauroyl lysine, metal soap, bismuth oxychloride, , barium sulfate, boron nitride, calcium carbonate, magnesium carbonate, magnesium hydrogen carbonate, and hydroxyapatite.

The spherical filler may comprise at least one organopolysiloxane elastomer powder.

In a preferred embodiment, 50wt% or more of the spherical filler may be the organopolysiloxane elastomer powder(s).

The organopolysiloxane elastomer powder may be chosen from those obtained from:

- a crosslinking addition reaction of diorganopolysiloxane comprising at least one hydrogen linked to silicon and of diorganopolysiloxane comprising at least one ethylenically unsaturated group linked to silicon;
- a dehydrogenation crosslinking condensation reaction between a diorganopolysiloxane comprising at least one hydroxyl end group and a diorganopolysiloxane comprising at least one hydrogen linked to silicon;
- a crosslinking condensation reaction of a diorganopolysiloxane comprising at least one hydroxyl end group and of a hydrolysable organopolysilane;
- thermal crosslinking of organopolysiloxane; and
- crosslinking of organopolysiloxane by high-energy radiation.

The organopolysiloxane elastomer powder may be obtained via a

crosslinking addition reaction of a diorganopolysiloxane comprising at least two hydrogens each linked to silicon, and a diorganopolysiloxane comprising at least two ethylenically unsaturated groups linked to silicon.

The organopolysiloxane elastomer powder may be obtained by reaction of a dimethylpolysiloxane comprising dimethylvinylsiloxyl end groups and of methylhydrogenopolysiloxane comprising trimethylsiloxyl end groups, in the presence of a platinum catalyst.

The organopolysiloxane elastomer powder may comprise an elastomeric organopolysiloxane powder which has been coated with at least one silicone resin.

The silicone resin may be silsesquioxane resin.

The powdery cosmetic composition may be anhydrous.

BEST MODE FOR CARRYING OUT OF THE INVENTION

After diligent research, the inventors have discovered that it is possible to provide a powdery cosmetic composition in the form of a compacted powder with good compactability as well as good cosmetic properties such as adhesion to the skin and spreadability on the skin, by using a combination with two non-spherical fillers with different average particle sizes, in specific amounts, wherein one (with smaller average particle size) of the two non-spherical fillers is coated with at least a silicone oil, and the other (with larger average particle size) is coated with at least a non-silicone oil.

The powdery cosmetic composition according to the present invention will be explained below in a detailed manner.

The powdery cosmetic composition according to the present invention comprises a pulverulent phase, as a main component. The total amount of the pulverulent phase, may be from 70 to 100% by weight, preferably 80 to 95% by weight, more preferably 85 to 95% by weight relative to the total weight of the powdery cosmetic composition.

(Spherical filler)

The pulverulent phase comprises at least one spherical filler in an amount of 10wt% or more based on the total weight of the composition.

The composition disclosed herein may comprise the spherical filler in an amount ranging from 10% to 60% by weight, for example, ranging from 15% to 45% by weight, further, for example, ranging from 15% to 30% by weight and, even further, for example, ranging from 15% to 25% by weight, relative to the total weight of the composition.

The spherical filler may be organic or inorganic.

As the inorganic spherical filler, mention may be made of silica microspheres, for example, of open porosity, such as hollow silica microspheres, including the products "Silica Beads SP 700/HA(R)" and "Silica Beads SB 700(R)" from the company Maprecos, and "Sunspheres H-33(R)" and "Sunspheres H-51(R)" from the company Asahi Glass.

It is preferable that the spherical filler is chosen from organic spherical fillers.

In some embodiments, the organic spherical fillers are not film-forming, i.e., they do not form a continuous film when deposited onto keratin layers such as the skin.

The organic spherical filler may be chosen, for example, from: (meth)acrylic or (meth)acrylate powders, for example, polymethylmethacrylate powders; polyacrylonitrile powders; polyurethane powders; polyamide powders; organopolysiloxane powders; and the like, as well as a mixture thereof.

According to one embodiment, the composition may comprise at least one spherical filler of polymethylmethacrylate.

The polymethylmethacrylate powder may be in the form of hollow or solid white spherical particles generally with a number-average size of micrometer order, for example, ranging from 3 to 15 microns and, further, for example, ranging from 3 to 10 microns. As used herein, the expression "number-average size" means the size given by the statistical particle size distribution to half of the population, referred to as D50.

It is also possible to characterize the polymethylmethacrylate particles by their density, which can vary, for example, as a function of the size of the spherical cavity of the particles.

In accordance with the embodiments disclosed herein, this density is assessed according to the following protocol, referred to as the packed density: $m=40$ g of powder is poured into a measuring cylinder; the measuring cylinder is then placed on a Stav 2003 machine from Stampf Volumeter; the measuring cylinder is then subjected to 1500 packing motions; the final volume V_f of packed powder is then measured directly on the measuring cylinder. The packed density is determined by the ratio m/V_f , in this instance $40/V_f$ (V_f being expressed in cm^3 and m in g).

For example, the density of the polymethylmethacrylate powder that may be used in the embodiments disclosed herein may range, for example, from 0.3 to 1.5, further, for example, from 0.5 to 1.5

and, even further, for example, from 1 to 1.5.

As non-limiting illustrations of the polymethylmethacrylate powder that is suitable for use in the composition disclosed herein, mention may be made, for example, of the polymethylmethacrylate particles sold by the company Matsumoto Yushi Co. under the name "Micropearl M100", by the company LCW under the name "Covabead LH 85" and those sold by the company Nihon Junyaku under the name "Jurymer MB1".

The polymethylmethacrylate powder may be present in an amount ranging from 1% to 20% by weight, for example, ranging from 2% to 15% by weight and further, for example, ranging from 3% to 10% by weight, relative to the total weight of the composition.

According to one embodiment, the composition may comprise at least one spherical filler of polyacrylonitrile.

The polyacrylonitrile powder may be chosen from acrylonitrile homopolymer powders and acrylonitrile copolymer powders, and, for example, expanded hollow particles of acrylonitrile homopolymer or copolymer. For example, the powders may be made of any expanded acrylonitrile homopolymer or copolymer that is non-toxic and a non-irritant to the skin.

For example, the mass per unit volume of the particles is chosen in the range from 15 kg/m³ to 200 kg/m³, for example, from 40 kg/m³ to 120 kg/m³ and even further, for example, from 60 kg/m³ to 80 kg/m³. To obtain this low mass per unit volume, expanded polymer or copolymer particles, for example, based on acrylonitrile and on an acrylic or styrene monomer and/or on vinylidene chloride, may be used.

It is possible to use, for example, a copolymer comprising: from 0% to 60% of units derived from vinylidene chloride, from 20% to 90% of units derived from acrylonitrile and from 0% to 50% of units derived from an acrylic or styrene monomer, wherein the sum of the percentages (by weight) is equal to 100. The acrylic monomer may, for example, be a methyl or ethyl acrylate or methacrylate. The styrene monomer may, for example, be α -methylstyrene or styrene.

In one embodiment, the powders used in the composition disclosed herein are chosen from hollow particles of an expanded copolymer of vinylidene chloride and of acrylonitrile or of vinylidene chloride and of acrylonitrile and of methacrylate. These powders may be dry or hydrated.

The powders may be obtained, for example, according to the processes disclosed in Patent and Patent Application Nos. EP 56219, EP 348372, EP 486080, EP 320473, EP 112807 and U.S. Pat. No. 3,615,972.

The internal cavity of the powder particles in principle comprises at least one gas, which may be chosen from air, nitrogen, and hydrocarbons, such as isobutane and isopentane.

In some embodiments, the powder particles disclosed herein have a particle size ranging from 1 μm to 80 μm , for example, ranging from 10 μm to 50 μm and from 10 μm to 30 μm .

The powder particles may be chosen, for example, from expanded terpolymer micro-spheres of vinylidene chloride, of acrylonitrile and of methacrylate, sold under the brand name Expancel by the company Expancel under the references 551 DE 50 (particle size of 40 μm), 551 DE 20 (particle size of 30 μm and mass per unit volume of 65 kg/m^3), 551 DE 12 (particle size of 12 μm), 551 DE 80 (particle size of 80 μm) and 461 DE 50 (particle size of 50 μm). It is also possible to use microspheres formed from the same expanded terpolymer having a particle size of 8 μm and a mass per unit volume of 70 kg/m^3 , referred to hereinbelow as EL 23, or having a particle size of 34 μm and a mass per unit volume of 20 kg/m^3 , referred to hereinbelow as EL 43.

The acrylonitrile powder may be present in the composition disclosed herein in an amount ranging from 0.02% to 2% by weight, for example, ranging from 0.1% to 1.5% by weight, and, further, for example, ranging from 0.1% to 1.2% by weight, relative to the total weight of the composition.

According to one embodiment, the composition may comprise at least one spherical filler of polyurethane.

The polyurethane powder may be a powder of a copolymer of hexamethylene diisocyanate and trimethylol hexyl lactone. Such a polyurethane powder is sold, for example, under the names "Plastic Powder D-400" and "Plastic Powder D-800" by the company Toshiki. Other polyurethane powders that may be used include the product sold under the name "Plastic Powder CS-400" by the company Toshiki.

The polyurethane powder may be present in the composition disclosed herein in an amount ranging from 1% to 20% by weight, for example, ranging from 2% to 15% by weight and, further, for example, ranging from 3% to 10% by weight, relative to the total weight of the composition.

According to one embodiment, the composition may comprise at least one spherical filler of polyamide.

Polyamide powders useful in the invention may be those listed under the CTFA name of "Nylon 12" or "Nylon 6". A mixture of particles and, for example, a mixture of Nylon-6 and Nylon-12 may be used.

The polyamide powder particles used in the invention include those

sold under the names "Orgasol" by the company Atochem. The process for obtaining these particles is, for example, the process described in document FR-A-2 619 385 or in document EP-A-303 530. These polyamide powder particles are moreover known according to their various physicochemical properties under the name "polyamide 12" or "polyamide 6".

Particles useful in the present invention may also include those sold under the name SP500 by the company TORAY.

The polyamide powder may be present in the composition disclosed herein in an amount ranging from 1% to 20% by weight, for example, ranging from 2% to 15% by weight and, further, for example, ranging from 3% to 10% by weight, relative to the total weight of the composition.

According to a preferred embodiment, the composition may comprise at least one spherical filler of organopolysiloxane.

The organopolysiloxane may be elastomeric or non-elastomeric. It is preferable to use elastomeric organopolysiloxane powder or organopolysiloxane elastomer powder.

The elastomeric organopolysiloxane may, for example, be crosslinked and may be obtained

via a crosslinking addition reaction of diorganopolysiloxane comprising at least one hydrogen linked to silicon and of diorganopolysiloxane comprising at least one ethylenically unsaturated group linked to silicon, preferably, in the presence, for example, of a platinum catalyst; or

via a dehydrogenation crosslinking condensation reaction between a diorganopolysiloxane comprising at least one hydroxyl end group and a diorganopolysiloxane comprising at least one hydrogen linked to silicon, preferably, in the presence of, for example, an organotin compound; or

via a crosslinking condensation reaction of a diorganopolysiloxane comprising at least one hydroxyl end group and of a hydrolysable organopolysilane; or

via thermal crosslinking of organopolysiloxane, preferably, in the presence of, for example, an organoperoxide catalyst; or

via crosslinking of organopolysiloxane by high-energy radiation such as gamma rays, ultraviolet rays or an electron beam.

In one embodiment, the elastomeric organopolysiloxane powder is crosslinked and is obtained via a crosslinking addition reaction of a diorganopolysiloxane (B2) comprising at least two hydrogens, each linked to a silicon, and of a diorganopolysiloxane (A2) comprising at least two ethylenically unsaturated groups linked to silicon, preferably, in the presence of, for example, a platinum catalyst (C2), for instance as described in Patent Application No. EP-A-295886.

For example, the organopolysiloxane may be obtained via a reaction of dimethylpolysiloxane comprising dimethylvinylsiloxyl end groups and of methylhydrogenopolysiloxane comprising trimethylsiloxyl end groups, in the presence of a platinum catalyst.

Compound (A2) is the base reagent for the formation of elastomeric organopolysiloxane and the crosslinking takes place via an addition reaction of compound (A2) with compound (B2) in the presence of the catalyst (C2).

Compound (A2) may, for example, be a diorganopolysiloxane comprising at least two lower alkenyl groups (for example C2-C4); the lower alkenyl group may be chosen from vinyl, allyl and propenyl groups. These lower alkenyl groups may be located in any position of the organopolysiloxane molecule, but in one embodiment are located at the ends of the organopolysiloxane molecule. The organopolysiloxane (A2) may have a branched-chain, linear-chain, cyclic or network structure; in one embodiment, the linear-chain structure may be used. Compound (A2) may have a viscosity ranging from the liquid state to the gum state. For example, compound (A2) may have a viscosity of at least 100 centistokes at 25°C.

The organopolysiloxanes (A2) may be chosen from methylvinylsiloxanes, methylvinylsiloxane-dimethylsiloxane copolymers, dimethylpolysiloxanes comprising dimethylvinylsiloxyl end groups, dimethylsiloxane-methylphenylsiloxane copolymers comprising dimethylvinylsiloxyl end groups, dimethylsiloxane-diphenylsiloxane-methylvinylsiloxane copolymers comprising dimethylvinylsiloxyl end groups, dimethylsiloxane-methylvinylsiloxane copolymers comprising trimethylsiloxyl end groups, dimethylsiloxane-methylphenylsiloxane-methylvinylsiloxane copolymers comprising trimethylsiloxyl end groups, methyl(3,3,3-trifluoropropyl)polysiloxane comprising dimethylvinylsiloxyl end groups, and dimethylsiloxane-methyl(3,3,3-trifluoropropyl)siloxane copolymers comprising dimethylvinylsiloxyl end groups.

Compound (B2) may, for example, be an organopolysiloxane comprising at least two hydrogens linked to silicon in each molecule and is thus the crosslinking agent for the compound (A2).

In one embodiment, the sum of the number of ethylenic groups per molecule of compound (A2) and the number of hydrogen atoms linked to silicon per molecule of compound (B2) is at least 4.

Compound (B2) may be of any molecular structure. In one embodiment, compound (B2) is of linear-chain or branched-chain structure or cyclic structure.

Compound (B2) may have a viscosity at 25°C ranging from 1 to 50000 centistokes, for example, in order to have good miscibility with compound (A2).

In one embodiment, compound (B2) may be added in an amount such that the molecular ratio between the total amount of hydrogen atoms linked to silicon in compound (B2) and the total amount of all the ethylenically unsaturated groups in compound (A2) is within the range from 1:1 to 20:1.

Compound (B2) may be chosen from methylhydrogenopolysiloxanes comprising trimethylsiloxy end groups, dimethylsiloxane-methylhydrogenosiloxane copolymers comprising trimethylsiloxy end groups, and cyclic dimethylsiloxane-methylhydrogenosiloxane copolymers.

Compound (C2) is the crosslinking reaction catalyst, and may, for example, be chosen from chloroplatinic acid, chloroplatinic acid-olefin complexes, chloroplatinic acid-alkenylsiloxane complexes, chloroplatinic acid-diketone complexes, platinum black, and platinum on a support.

The catalyst (C2) may, for example, be added in an amount ranging from 0.1 to 1000 parts by weight and, further, for example, from 1 to 100 parts by weight, as clean platinum metal, per 1000 parts by weight of the total amount of compounds (A2) and (B2).

Other organic groups may be linked to silicon in the organopolysiloxanes (A2) and (B2) described previously, for example, alkyl groups, such as methyl, ethyl, propyl, butyl or octyl; substituted alkyl groups, such as 2-phenylethyl, 2-phenylpropyl or 3,3,3-tri-fluoropropyl; aryl groups, such as phenyl, tolyl or xylyl; substituted aryl groups, such as phenylethyl; and substituted monovalent hydrocarbon-based groups, such as an epoxy group, a carboxylate ester group or a mercapto group.

In some embodiments, the at least one elastomeric organopolysiloxane powder may, for example, be chosen from non-emulsifying elastomers. As used herein, the term "non-emulsifying" means organopolysiloxane elastomers not comprising a hydrophilic chain, such as polyoxyalkylene or polyglycerolated units.

Spherical elastomeric organopolysiloxanes are, for example, described in Patent Application Nos. JP-A-61-194 009, EP-A-242 219, EP-A-295 886 and EP-A-765 656, the contents of which are incorporated by reference.

Elastomer organopolysiloxane powders that may be used include those sold under the names "Dow Corning 9505 Powder" and "Dow Corning 9506 Powder" by the company Dow Corning; these powders have the

INCI name: dimethicone/vinyl dimethicone crosspolymer.

The elastomeric organopolysiloxane powder may, for example, be chosen from elastomeric organopolysiloxane powders coated with silicone resin, for example, with silsesquioxane resin, as described, for example, in U.S. Pat. No. 5,538,793, the content of which is incorporated by way of reference. Such elastomeric powders are sold under the names "KSP-100", "KSP-101", "KSP-102", "KSP-103", "KSP-104" and "KSP-105" by the company Shin-Etsu, and have the INCI name: vinyl dimethicone/methicone silsesquioxane crosspolymer.

Other elastomeric organopolysiloxanes in the form of spherical powders may be powders of hybrid silicone functionalized with fluoroalkyl groups, sold, for example, under the name "KSP-200" by the company Shin-Etsu and powders of hybrid silicones functionalized with phenyl groups, sold, for example, under the name "KSP-300" by the company Shin-Etsu.

In one embodiment, the composition may, for example, comprise at least two powders of elastomeric organopolysiloxane chosen from elastomeric organopolysiloxane powders coated with silicone resin, for example, with silsesquioxane resin, as described previously.

In some embodiments, the composition disclosed herein may comprise at least one elastomeric organopolysiloxane spherical powder chosen from elastomeric organopolysiloxane spherical powders coated with at least one silicone resin, for example, with silsesquioxane resin, in an amount ranging from 1% to 25% by weight, for example, from 1% to 15% by weight, further, for example, ranging from 2% to 8% by weight and, even further, for example, ranging from 3% to 7% by weight, relative to the total weight of the composition.

The composition disclosed herein may comprise a mixture of at least one elastomeric organopolysiloxane spherical powder chosen from elastomeric organopolysiloxane spherical powders coated with silicone resin, for example, with silsesquioxane resin, and uncoated elastomeric organopolysiloxane spherical powders. In such a mixture, the elastomeric organopolysiloxane spherical powders coated with silicone resin, for example, with silsesquioxane resin, may be present in an amount ranging from 1% to 10% by weight, for example, ranging from 2% to 8% by weight and, further, for example, ranging from 3% to 7% by weight, relative to the total weight of the composition; the uncoated elastomeric organopolysiloxane spherical powders may be present in an amount ranging from 1% to 10% by weight, for example, ranging from 2% to 8% by weight and, further, for example, ranging from 3% to 7% by weight, relative to the total weight of the composition.

The elastomeric organopolysiloxane powder may be present in the composition disclosed herein in an amount ranging from 50% to 100%

by weight, for example, ranging from 50% to 90% by weight and, further, for example, ranging from 50% to 80% by weight, relative to the total weight of the spherical fillers.

The composition disclosed herein may comprise the elastomeric organopolysiloxane powder in an amount ranging from 1% to 30% by weight, for example, ranging from 2% to 20% by weight, further, for example, ranging from 3% to 15% by weight and, even further, for example, ranging from 5% to 10% by weight, relative to the total weight of the composition.

(Non-Spherical Fillers)

The composition according to the present invention comprises a relatively large amount of spherical filler(s) as described above. Thus, the composition can exhibit soft texture and can easily be picked up by fingers and the like.

However, the relatively large amount of spherical filler(s) tends to affect the compactability of the composition according to the present invention as well as cosmetic properties such as adhesion to a keratin substance such as the skin.

According to the present invention, in order to establish both good compactivity and good cosmetic properties such as good adhesion and spreadability, the powdery cosmetic composition according to the present invention comprises two non-spherical fillers with different average particle sizes, wherein the fillers have been differently surface-treated.

As used herein, the term "filler" means a substantially uncolored compound that is solid at room temperature and atmospheric pressure, and insoluble in the various ingredients of the composition, even when these ingredients are brought to a temperature above room temperature. The filler may or may not be porous.

The "non-spherical" filler may be of any form other than spherical, for example, platelet-shaped, spherical, and oblong, irrespective of their crystallographic form (for example lamellar, cubic, hexagonal, and orthorhombic). In a preferred embodiment, the non-spherical filler is in a lamellar form. Preferably, the non-spherical filler has a high aspect ratio of 10 or more. The aspect ratio may be 20 or more or 50 or more. The aspect ratio can be determined by the average thickness and the average length according to the formula: aspect ratio = length/thickness.

The term "average particle size" here means the size given by the statistical particle size distribution to half of the population, referred to as D50.

The material of the non-spherical filler is not limited, but is

preferably selected from the group consisting of talc, mica, silica, kaolin, sericite, calcinated talc, calcinated mica, calcinated sericite, synthetic mica, lauroyl lysine, metal soap, bismuth oxychloride, barium sulfate, boron nitride, calcium carbonate, magnesium carbonate, magnesium hydrogen carbonate, and hydroxyapatite. As the material, talc, mica, kaolin, sericite are more preferable, and talc and mica are even more preferable. A mixture of these may be used as the material for the non-spherical filler. The materials of the two non-spherical fillers may be the same or different. In a preferred embodiment, it is used talc.

The two non-spherical fillers are composed of a first non-spherical filler with a smaller average particle size, and a second non-spherical filler with a larger average particle size.

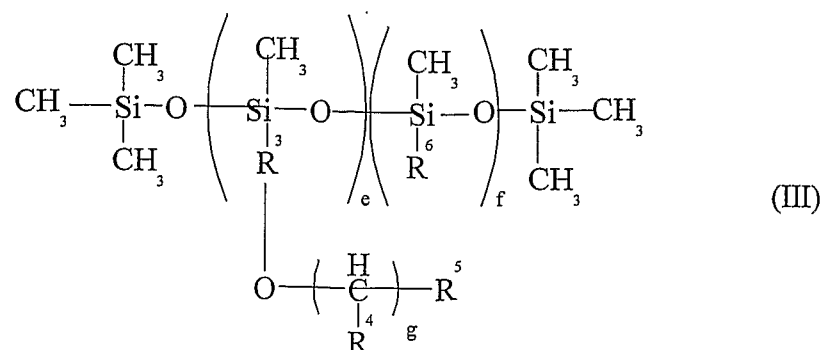
Preferably, the first non-spherical filler with a smaller average particle size may have an average particle size of less than 6 μm , such as 0.1 to 6 μm , for example, from 1 to 6 μm . On the other hand, the second non-spherical filler with a larger average particle size may have an average particle size of 6 μm or more and 10 μm , such as 6 to 9 μm , for example, from 7 to 9 μm .

According to the present invention, the first non-spherical filler with a smaller average particle size has been surface-treated with a surface treatment agent comprising a silicone oil. On the other hand, the second non-spherical filler with a larger average particle size has been surface-treated with a surface treatment agent comprising at least one non-silicone oil.

The silicone oil may be selected from polydialkylsiloxanes such as polydimethylsiloxane, polyalkylaryldiloxanes such as polymethylphenylsiloxane, polydiarylsiloxanes such as polydiphenylsiloxanes, polyalkylhydrogensiloxanes such as methylhydrogenpolysiloxane, and modified-polysiloxanes.

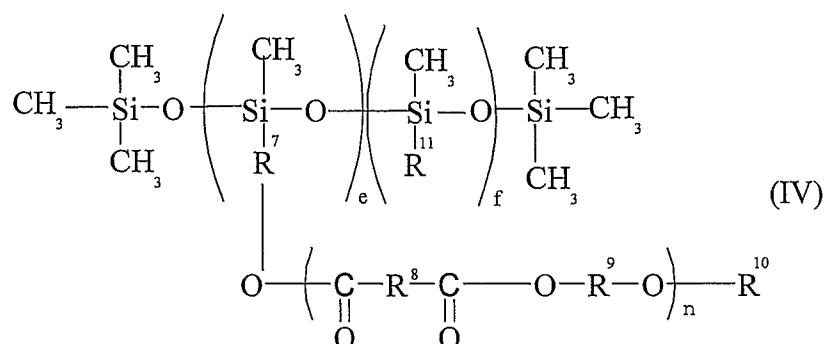
The modified-polysiloxanes may be chosen from the following formulae:

- (a¹) modified polysiloxanes bearing polyethers, chosen from compounds of formula (III):



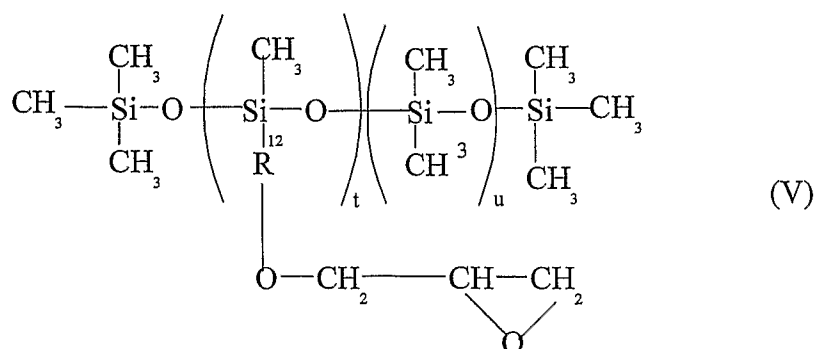
wherein

- R³ comprises -(CH₂)_h-;
- R⁴ comprises -(CH₂)_i-CH₃;
- R⁵ is chosen from -OH, -COOH, -CH=CH₂, -C(CH₃)=CH₂ and -(CH₂)_j-CH₃;
- R⁶ comprises -(CH₂)_k-CH₃;
- g and h independently range from 1 to 15;
- j and k independently range from 0 to 15;
- e ranges from 1 to 50; and
- f ranges from 1 to 300;
- (a²) modified polysiloxanes bearing polyesters, chosen from compounds of formula (IV):



wherein

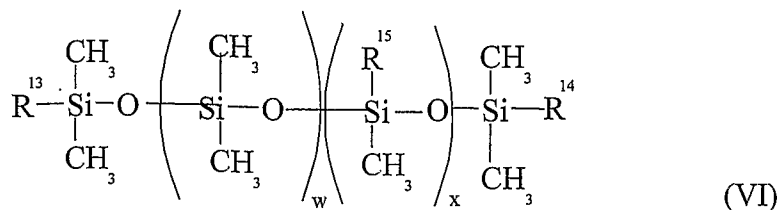
- R^7 , R^8 and R^9 are independently chosen from $-(CH_2)_q-$;
 - R^{10} is chosen from $-OH$, $-COOH$, $-CH=CH_2$, $-C(CH_3)=CH_2$ and $-(CH_2)_r-CH_3$;
 - R^{11} comprises $-(CH_2)_s-CH_3$;
 - n and q independently range from 1 to 15;
 - r and s independently range from 0 to 15;
 - e ranges from 1 to 50; and
 - f ranges from 1 to 300;
- (a³) modified polysiloxanes bearing epoxy radicals, chosen from compounds of formula (V):



wherein

- R¹² comprises -(CH₂)_v-;
 - v ranges from 1 to 15;
 - t ranges from 1 to 50; and
 - u ranges from 1 to 300;
- and
- mixtures thereof.

Alternatively, the modified-polysiloxane may be chosen from compounds of formula (VI):



wherein

- R^{13} and R^{14} are independently chosen from $-\text{OH}$, R^{16}OH and R^{17}COOH ;
- R^{15} is chosen from $-\text{CH}_3$ and $-\text{C}_6\text{H}_5$;
- R^{16} and R^{17} comprise $-(\text{CH}_2)_y-$;
- y ranges from 1 to 15;
- w ranges from 1 to 200; and
- x ranges from 0 to 100.

It is preferable that the silicone oil is a polydialkylsiloxane such as polydimethylsiloxane or a mixture of polydialkylsiloxanes.

The surface treatment agent for the first non-spherical filler with a smaller average particle size may comprise at least one silicone oil, in particular dimethylpolysiloxane.

According to one embodiment of the present invention, the surface treatment of the first non-spherical filler with a smaller average particle size may be chosen from the following treatments:

PEG-silicone treatments, for instance the AQ surface treatment sold by LCW;

methicone treatments, for instance the SI surface treatment sold by LCW; and

dimethicone treatments, for instance the Covasil 3.05 surface treatment sold by LCW, or the SA surface treatments sold by Miyoshi Kasei, and in particular the product SA-TA-13R sold by MIYOSHI KASEI (INCI Name Talc and dimethicone).

In a preferred embodiment, it is used a dimethicone treated talc.

The surface treatment agent for the second non-spherical filler with a larger average particle size comprises at least one non-silicone oil. In particular, the non-silicone oil is a vegetable oil, preferably a vegetable oil solid at ambient temperature. In a preferred embodiment, the non-silicone oil is a hydrogenated vegetable oil. In a preferred embodiment, the hydrogenated vegetable oil is a hydrogenated palm oil. The surface treatment agent for the second non-spherical filler with a larger average particle size may also comprise, in addition to the non-silicone oil, at least one silicone oil.

It is preferable that the surface treatment agent for the second

non-spherical filler with a larger average particle size comprises a silicone oil, in particular dimethylpolysiloxane, in addition to the non-silicone oil. It is most preferable that the surface treatment agent for the second non-spherical filler with a larger average particle size consists of a silicone oil, in particular dimethylpolysiloxane, and a hydrogenated oil, in particular a hydrogenated palm oil.

According to one embodiment of the present invention, the surface treatment of the second non-spherical filler with a larger average particle size may be chosen from the following treatments:

- hydrogenated palm oil treatments,
- methicone/hydrogenated palm oil treatments, for instance the SNVI surface treatment sold by Miyoshi Kasei; in particular talc treated with methicone/hydrogenated palm oil (SNVI-TA-46R) sold by Miyoshi Kasei or synthetic mica treated with methicone/hydrogenated palm oil (SNVI-Synthetic mica PDM-8W) sold by Miyoshi Kasei.

In a preferred embodiment, it is used the talc treated by methicone/hydrogenated palm oil sold by Miyoshi Kasei under the name SNVI-TA-46R.

The non-spherical fillers that have been surface-treated beforehand, which are useful in the context of the present invention, may be chosen from non-spherical fillers that have totally or partially undergone a surface treatment chosen from chemical, electronic, electrochemical, mechanochemical, and mechanical surface treatments, with at least one surface treatment agent such as those described above before being dispersed in the composition in accordance with the present invention.

For the purposes of the present invention, the surface treatment is such that a surface-treated filler conserves its intrinsic pretreatment filling properties.

In at least one embodiment, the surface-treated fillers that are useful in the context of the present invention may also have been treated with a mixture of these compounds and/or may have undergone several surface treatments.

The surface-treated fillers that are useful in the context of the present invention may be prepared according to surface-treatment techniques that are known to those skilled in the art, or may be commercially available in the required form.

The surface treatment agent with which the fillers are treated may be deposited on the fillers by any known method, for example, evaporation of solvent, chemical reaction between the molecules of the surface treatment agent or creation of a covalent bond between the surface treatment agent and the fillers.

The surface treatment may thus be performed, for example, by chemical reaction of the surface treatment agent with the surface of the fillers and creation of a covalent bond between the surface treatment agent and the fillers. This method is described, for example, in U.S. Pat. No. 4,578,266.

The surface treatment agent may be present in the composition in an amount ranging from 0.1% to 50% by weight, for example, from 0.5% to 30% by weight, or from 1% to 10% by weight relative to the total weight of the surface-treated fillers.

The first non-spherical filler with a smaller average particle size may be present in the composition in total amounts ranging from 20% to 60% by weight, for example, from 25% to 50% by weight, or from 30% to 40% by weight relative to the total weight of the composition.

The second non-spherical filler with a larger average particle size may be present in the composition in total amounts ranging from 5% to 20% by weight, for example, from 10% to 15% by weight, or from 8% to 12% by weight relative to the total weight of the composition.

The ratio of the amount of the first non-spherical filler with a smaller average particle size to the amount of the second non-spherical filler with a larger average particle size is 1 or more, preferably 2 or more, and more preferably 3 or more.

The ratio of the total amount of the two non-spherical fillers to the amount of the spherical filler is 1 or more, preferably 2 or more, and more preferably 3 or more.

(Additional Components)

The composition disclosed herein may comprise at least one pulverulent dyestuff, which may be chosen from pigments and nacles.

As used herein, the term "pigments" should be understood as meaning white or colored, mineral or organic particles of any shape, which are insoluble in the physiological medium, and which are intended to color the composition.

As used herein, the term "nacles" should be understood as meaning iridescent particles of any shape, for example, produced in the shell of certain molluscs or alternatively synthesized.

The pigments may be white or colored, and mineral and/or organic. Among the mineral pigments that may be mentioned are titanium dioxide, optionally surface-treated, zirconium oxide or cerium oxide, and also zinc oxide, iron oxide (black, yellow or red) or chromium oxide, manganese violet, ultramarine blue, chromium

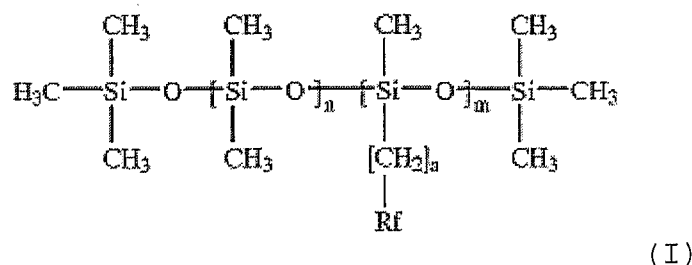
hydrate and ferric blue, and metal powders, such as aluminum powder or copper powder.

Among the organic pigments that may be mentioned are carbon black, pigments of D & C type, and lakes based on cochineal carmine or on barium, strontium, calcium or aluminum.

The nacreous pigments may be chosen from white nacreous pigments such as mica coated with titanium or with bismuth oxychloride, colored nacreous pigments, such as titanium mica coated with iron oxides, titanium mica coated, for example, with ferric blue or with chromium oxide, titanium mica coated with an organic pigment of the above-mentioned type, and also nacreous pigments based on bismuth oxychloride.

The composition disclosed herein may, for example, comprise at least one fatty phase, which may comprise at least one oil. This type of fatty phase is also commonly referred to as a binder, and serves, for example, as a dispersing medium for the pulverulent phase.

The oil may be chosen from the oils conventionally used as a binder in compacted powders. For example, the oil may be chosen from: mink oil, turtle oil, soybean oil, grapeseed oil, sesame seed oil, corn oil, rapeseed oil, sunflower oil, cottonseed oil, avocado oil, olive oil, castor oil, jojoba oil, and groundnut oil; hydrocarbon oils, such as liquid paraffin, squalane, and petroleum jelly; fatty esters, such as isopropyl myristate, isopropyl palmitate, butyl stearate, isodecyl stearate, isocetyl stearate, hexyl laurate, isononyl isononanoate, 2-ethylhexyl palmitate, 2-hexyldecyl laurate, 2-octyldecyl palmitate, 2-octyldodecyl myristate, and lactate, 2-diethylhexyl succinate, diisostearyl malate, glyceryl triisostearate, and diglyceryl triisostearate; silicone oils, such as polymethylsiloxanes, polymethylphenylsiloxanes, polysiloxanes modified with fatty acids, with fatty alcohols or with polyoxyalkylenes, fluoro silicones, and perfluoro oils; higher fatty acids, such as myristic acid, palmitic acid, stearic acid, behenic acid, oleic acid, linoleic acid, linolenic acid, and isostearic acid; higher fatty alcohols, such as cetanol, stearyl alcohol, and oleyl alcohol; and poly methylfluoroalkyl dimethylsiloxanes of formula (I):



wherein:

n is an integer ranging from 5 to 90, for example, from 30 to 80 and, further, for example, from 50 to 80;

m is an integer ranging from 1 to 150, for example, from 1 to 80 and, further, for example, from 1 to 40;

a is an integer ranging from 0 to 5, and

Rf is chosen from perfluoroalkyl radicals comprising from 1 to 8 carbon atoms.

Examples of compounds of formula (I) include those sold under the names X22-819, X22-820, X22-821 and X22-822 by the company Shin-Etsu.

The composition disclosed herein may comprise the oil in an amount ranging from 1% to 20% by weight and, further, for example, from 2% to 15% by weight, relative to the total weight of the composition.

The composition may comprise at least one other common cosmetic ingredient, which may be chosen, for example, from antioxidants, fragrances, preserving agents, neutralizers, surfactants, waxes, sunscreens, vitamins, moisturizers, self-tanning compounds, and antiwrinkle active agents.

Needless to say, a person skilled in the art will take care to select this or these optional additional compound(s), and/or the amount thereof, such that the advantageous properties of the composition disclosed herein are not, or are not substantially, adversely affected by the envisaged addition(s).

These additional or optional component(s) may be present in the powdery cosmetic composition in an amount ranging from 0.1% to 15% by weight, preferably 1% to 10% by weight, more preferably 3% to 5% by weight relative to the total weight of the powdery cosmetic composition.

In one embodiment, the composition disclosed herein is an anhydrous composition. As used herein, the term "anhydrous composition" means a composition comprising no more than 2% by weight of water, for example, no more than 0.5% of water, and, for example, free of water, wherein the water is not added during the preparation of the composition, but corresponds to the residual water provided by the mixed ingredients.

The composition disclosed herein is in the form of a compacted powder. As used herein, the term "compacted powder" means a powder pressed using a manual or mechanical press. A person skilled in the art has no difficulty in preparing the compacted powder by using well-known methods, such as a so-called dry process and wet process.

In the dry process, the components of the powdery cosmetic composition are filled into a container such as a pan. After filling,

they are pressed by mechanical force provided by an electric motor, a hydraulic ram or a pneumatic cylinder, etc., in order to compact the components to prepare the compacted powder. Supersonic waves may be added, if necessary, to the components as described in JP-A-H05-70325.

In the wet process, on the other hand, the components of the powdery cosmetic composition are dispersed once in a large amount of a solvent to make a slurry. Then, the slurry is filled into a container. After the filling, the slurry is pressed by mechanical force while the solvent is removed simultaneously and/or sequentially in order to solidify the slurry.

EXAMPLES

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

Example 1 and Comparative Examples 1 to 4

The powdery cosmetic compositions according to Example 1 and Comparative Examples 1 to 4 which have the following formulas shown in Table 1 are prepared. The numerals in Table 1 are based on percentage by weight relative to the total weight of the composition.

Table 1

	Example 1	Comp. Ex. 1	Comp. Ex. 2	Comp. Ex. 3	Comp. Ex. 4
Silicone-treated talc (first non spherical filler)*	32.31	-	-	32.31	42.31
Silicone-treated talc**	-	32.31	-	10	-
Silicone-treated talc***	-	-	32.31	-	-
Silicone/Hydrogenated oil-treated talc (second non spherical filler)****	10	10	10	-	-
Mica and C ₉₋₁₅ fluoroalcohol phosphate 5%	18	18	18	18	18
Polymethylmethacrylate powder (spherical filler)	3	3	3	3	3
Polyamide powder (spherical filler)	3	3	3	3	3
Silicone elastomer (KSP-100) (spherical filler)	2	2	2	2	2
Silicone elastomer (KSP-300) (spherical filler)	4	4	4	4	4
Yellow iron oxide	1.98	1.98	1.98	1.98	1.98
Black iron oxide	0.36	0.36	0.36	0.36	0.36
Red iron oxide	0.65	0.65	0.65	0.65	0.65
Titanium oxide and lauroyl lysine (95/5) {LL 5 TITANIUM DIOXIDE CR 50 from DAITO KASEI KOGYO}	14	14	14	14	14
caprylic/capric triglycerides	1	1	1	1	1
Polydimethyl siloxane	2.3	2.3	2.3	2.3	2.3
Phenyltrimethicone	3	3	3	3	3
Sorbitan sesquileate (Surfactant)	1	1	1	1	1
Ethylhexyl methoxycinnamate (UV filter)	3	3	3	3	3
Preservative	0.4	0.4	0.4	0.4	0.4

Silicone-treated talc*: Talc and dimethicone (98/2) with average particle diameter 5.42µm sold by Miyoshi Kasei under the name SA-TA-13R
 Silicone-treated talc**: Talc and dimethicone (98/2) with average particle diameter 8.08µm sold by Miyoshi Kasei under the name SA-TA-46R
 Silicone-treated talc***: Talc and dimethicone (98/2) with average particle diameter 8.33µm sold by Miyoshi Kasei under the name SA-TA-68R
 Silicone/Hydrogenated oil-treated talc****: Talc and dimethicone and hydrogenated palm oil (97/1.5/1.5) with average particle diameter 8.00µm sold by Miyoshi Kasei under the name SNVI-TA-46R

For each of Example 1 and Comparative Examples 1 to 4, the powder components shown in Table 1 were mixed in a Henschel mixer for about 10 minutes. The non-powder components (oil, surfactant, UV filter and preservative) shown in Table 1 were added to the mixture, and mixed together for about 15 minutes. The mixture was pulverized by a Hammer mill. The pulverized powder was filtered with a mesh to form the powdery cosmetic compositions according to Example 1 and Comparative Examples 1 to 4.

[Hardness Evaluation]

13g of the powdery cosmetic composition of each of Example 1 and Comparative Examples 1 to 4 is compacted to form a sample which is a compacted powder in the cylinder form with a diameter of 80mm, with the pressure of 10kgf/cm² (first press) and 30kgf/cm² (second press).

The hardness of each sample obtained as above is measured with Asker Hardness Meter A1-type. The results are shown in Table 2.

[Compactability Evaluation]

The samples according to Example 1 and Comparative Examples 1 and 2 are subjected to the drop test in which each sample was dropped at the height of 20cm onto a ceramic tile. The chipping of each sample is determined, and the loss of powder is calculated. The results are shown in Table 2.

Table 2

	Example 1	Comp. Ex. 1	Comp. Ex. 2	Comp. Ex. 3	Comp. Ex. 4
Hardness	20.8	18.3	17.5	21.7	22.8
10 times loss rate (%)	0.2	3.7	3.1	0.1	0.1
20 times loss rate (%)	7.1	100	100	14	4

[Adhesion Evaluation]

The samples according to Example 1 and Comparative Examples 1 and 2 are subjected to an application test in which 100g of a powder is taken under the conditions of a length of 25 mm at a speed of 5mm/s by a sponge, and is applied onto skin model plates (Bio Skin T5) under the conditions of a length of 120 mm at a speed of 5mm/s, by using

Tribo Master TL-21.

The surface of each of the skin model plates is observed.

Example 1 shows better adhesion of the powder to the skin model plate than Comparative Examples 1 and 2. Furthermore, the surface of the skin model plate is more evenly and uniformly covered by the powder in Example 1, as compared to Comparative Examples 1 and 2.

[Sensory Evaluation]

The samples according to Example 1 and Comparative Examples 3 and 4 are subjected to sensory evaluation with regard to spreadability by 10 testers under the following criteria.

Score	Spreadability
1	Very good
2	Good
3	fair
4	Poor
5	Very poor

The average of the scores for each sample is sorted in accordance with the following standard. The results are shown in Table 4.

Very good: 5.0 to 4.5

Good: less than 4.5 to 3.5

Fair: less than 3.5 to 2.5

Poor: Less than 2.5 to 1.5

Very poor: less than 1.5

Table 3

	Example 1	Comp. Ex. 3	Comp. Ex. 4
Spreadability	Good	Good	Fair

As shown in Table 2, the hardness of the sample according to Example 1 is close to those of the samples according to Comparative Examples 1 to 4.

On the other hand, Example 1 exhibits superior compactability, as compared to Comparative Examples 1 to 3.

With regard to compactability, Comparative Example 4 is better than Example 1. However, as shown in Table 3, Comparative Example 4 exhibits worse spreadability.

With regard to adhesion, Example 1 exhibits better results as compared to Comparative Examples 1 and 2.

Accordingly, it can be understood from the above that only Example 1 can simultaneously exhibit good compactability as well as good cosmetic properties such as adhesion and spreadability.

Claims

1. A powdery cosmetic composition in the form of a compacted powder comprising:
at least one spherical filler in an amount of 10wt% or more based on the total weight of the composition; and
two non-spherical fillers with different average particle sizes wherein
the non-spherical filler with a smaller average particle size has been surface treated with a surface treatment agent comprising a silicone oil, and the non-spherical filler with a larger average particle size has been surface-treated with a surface treatment agent comprising at least one non-silicone oil; the ratio of the amount of the non-spherical filler with a smaller average particle size to the amount of the non-spherical filler with a larger average particle size is 1 or more; and
the ratio of the total amount of the two non-spherical fillers to the amount of the spherical filler is 1 or more.
2. The powdery cosmetic composition according to Claim 1, wherein the average particle size of the non-spherical filler with a smaller average particle size is less than 6 μ m; and
the average particle size of the non-spherical filler with a larger average particle size is 6 μ m or more and 10 μ m or less.
3. The powdery cosmetic composition according to Claim 1 or 2, wherein the ratio of the amount of the non-spherical filler with a smaller average particle size to the amount of the non-spherical filler with a larger average particle size is 2 or more, preferably 3 or more.
4. The powdery cosmetic composition according to any one of Claims 1 to 3, wherein the ratio of the total amount of the two non-spherical fillers to the amount of the spherical filler is 2 or more, preferably 3 or more.
5. The powdery cosmetic composition according to any one of Claims 1 to 4, wherein the non-silicone oil is a hydrogenated oil.
6. The powdery cosmetic composition according to any one of Claims 1 to 5, wherein the two non-spherical fillers are independently selected from the group consisting of talc, mica, silica, kaolin, sericite, calcinated talc, calcinated mica, calcinated sericite, synthetic mica, lauroyl lysine, metal soap, bismuth oxychloride, barium sulfate, boron nitride, calcium carbonate, magnesium

carbonate, magnesium hydrogen carbonate, and hydroxyapatite.

7. The powdery cosmetic composition according to any one of Claims 1 to 5, wherein the two non-spherical fillers are talc.
8. The powdery cosmetic composition according to any one of Claims 1 to 7, wherein the spherical filler comprises at least one organopolysiloxane elastomer powder.
9. The powdery cosmetic composition according to Claim 8, wherein 50wt% or more of the spherical filler is the organopolysiloxane elastomer powder.
10. The powdery cosmetic composition according to Claim 8 or 9, wherein the organopolysiloxane elastomer powder is chosen from those obtained from:
 - a crosslinking addition reaction of diorganopolysiloxane comprising at least one hydrogen linked to silicon and of diorganopolysiloxane comprising at least one ethylenically unsaturated group linked to silicon;
 - a dehydrogenation crosslinking condensation reaction between a diorganopolysiloxane comprising at least one hydroxyl end group and a diorganopolysiloxane comprising at least one hydrogen linked to silicon;
 - a crosslinking condensation reaction of a diorganopolysiloxane comprising at least one hydroxyl end group and of a hydrolysable organopolysilane;
 - thermal crosslinking of organopolysiloxane; and
 - crosslinking of organopolysiloxane by high-energy radiation.
11. The powdery cosmetic composition according to Claim 8 or 9, wherein the organopolysiloxane elastomer powder is obtained via a crosslinking addition reaction of a diorganopolysiloxane comprising at least two hydrogens each linked to silicon, and a diorganopolysiloxane comprising at least two ethylenically unsaturated groups linked to silicon.
12. The powdery cosmetic composition according to Claim 8 or 9, wherein the organopolysiloxane elastomer powder is obtained by reaction of a dimethylpolysiloxane comprising dimethylvinylsiloxy end groups and of methylhydrogenopolysiloxane comprising trimethylsiloxy end groups, in the presence of a platinum catalyst.
13. The powdery cosmetic composition according to any one of Claims

- 8 to 12, wherein the organopolysiloxane elastomer powder comprises an elastomeric organopolysiloxane powder which has been coated with at least one silicone resin.
14. The powdery cosmetic composition according to Claim 13, wherein the silicone resin is silsesquioxane resin.
15. The powdery cosmetic composition according to any one of Claims 1 to 14, wherein it is anhydrous.

INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2009/071358

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61K8/02 A61K8/04 A61K8/11 A61K8/24 A61K8/25
A61K8/31 A61K8/891 A61Q1/02 A61Q1/12
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61K A61Q

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/186235 A1 (MARTIN GUENAELE [FR] ET AL) 25 August 2005 (2005-08-25) paragraphs [0006] - [0009], [0169] - [0172]; example 3 -----	1-15
X	US 2006/034788 A1 (HORINO MASAOKIRA [JP] ET AL) 16 February 2006 (2006-02-16) examples -----	1-15
X	WO 03/078507 A1 (PROCTER & GAMBLE [US]) 25 September 2003 (2003-09-25) examples -----	1-15
A	US 2005/276776 A1 (LIECHTY ANNE [FR] ET AL) 15 December 2005 (2005-12-15) examples -----	1-15

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

☒ See patent family annex.

* Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

16 September 2010

Date of mailing of the international search report

23/09/2010

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/JP2009/071358

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