



(51) International Patent Classification:

A61K 8/81 (2006.01) A61K 8/92 (2006.01)  
A61K 8/89 (2006.01) A61K 8/06 (2006.01)  
A61K 8/891 (2006.01) A61Q 19/00 (2006.01)

(21) International Application Number:

PCT/US2016/036892

(22) International Filing Date:

10 June 2016 (10.06.2016)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/184,444 25 June 2015 (25.06.2015) US

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(81) Designated States (unless otherwise indicated, for every

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

(84) Designated States (unless otherwise indicated, for every

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

Published:

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



(54) Title: TRANSFER RESISTANT COSMETIC COMPOSITION

(57) Abstract: The present invention relates to a transfer-resistant cosmetic composition comprising at least one silicone film forming polymer derived from acrylic acid, at least one volatile solvent and a cosmetically acceptable carrier.

## TRANSFER RESISTANT COSMETIC COMPOSITION

## FIELD OF THE INVENTION

5           The present invention relates to transfer-resistant color cosmetics comprising copolymers of silicone and ethylenically unsaturated monomers such as acrylic acid, methacrylic acid or their simple esters in combination with a volatile solvent system.

## BACKGROUND OF THE INVENTION

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The ability of a cosmetic product to remain on a surface (e.g., skin, lips, hair, eyelashes, etc.) when that surface comes into contact with another surface is commonly referred to as "transfer resistance." Ideally, a cosmetic film should last until the consumer wants to remove it by washing with water or using remover compositions. However, many  
15 cosmetics are deficient in this regard and readily transfer to the fingers, napkins, clothing, utensils, cups, and the like. This problem is particularly disadvantageous with color cosmetics, such as lipsticks, foundations, and mascara, where clothing can become discolored on contact and the cosmetic must be frequently re-applied to maintain a fresh appearance. Thus, much effort has been directed to developing so-called transfer-resistant cosmetics.

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Transfer-resistant cosmetics typically employ a film forming polymer to provide the transfer resistant film on the skin, lips, hair or lashes. The class of polymers known as organosiloxanes, including polydimethylsiloxane (PDMS or Dimethicone), are well known for use in cosmetics due to their many desirable properties such as film forming, excellent spreading properties and biological inertness. More recently, the properties of silicone  
25 polymers have been modified by copolymerization with other organic monomers or polymers, such as polyurethanes, ethylenically unsaturated monomers or polymers thereof, and the like.

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For example, in U.S. Patent Pub. 2008/0019932, color cosmetic compositions comprising at least one silicone film forming polymer, at least one pigment, and at least one dispersant that aids in dispersion of the pigment and silicone film forming polymer in the composition are described. The silicone film forming polymer may be, among others, a  
30 silicone acrylate. Silicone acrylate is typically dissolved into one of various volatile solvents such as isododecane. But in order to develop suitable compositions, such as lipsticks, additional thickeners such as waxes are added to the matrix.

There is a need for color cosmetics which exhibit a diminished propensity to transfer or rub-off once applied to the skin, lips, or hair or a user and which exhibit longer wear than the presently available products. Additionally, there is a need for such a cosmetic which may be thickened without the necessity of secondary thickening agents.

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### SUMMARY OF THE INVENTION

The present invention relates to a transfer-resistant cosmetic composition comprising at least one copolymer of silicone and ethylenically unsaturated monomers, more specifically ethylenically unsaturated monomers which may be acrylic acid, methacrylic acid or their simple esters and at least one volatile solvent and a cosmetically acceptable carrier.

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### DETAILED DESCRIPTION OF THE INVENTION

The compositions of the invention comprise a copolymer of silicone and one or more ethylenically unsaturated monomers, such as acrylic acid, methacrylic acid or their simple esters and at least one volatile solvent derived from vegetable oil.

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By "derived from acrylic acid" is meant that the polymers are the reaction products of monomers which include unsaturated carboxylic acid or carboxylate groups, for example, acrylic acid monomers, esters of acrylic acid monomers (acrylates), alkyl- substituted acrylic acid and/or acrylates, and the like, as well as block or graft copolymers comprising such film forming polymer derived from acrylic acid. The term (alkyl)acrylate is meant to include polymers and copolymers of acrylic acid monomers or esters of acrylic acid monomers.

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All percentages, parts and ratios are based upon the total weight of the compositions of the present invention, unless otherwise specified. All such weights as they pertain to listed ingredients are based on the active level and therefore do not include solvents or by-products that may be included in commercially available materials, unless otherwise specified.

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All molecular weights as used herein are weight average molecular weights expressed as grams/mole, unless otherwise specified.

30

As used herein, the term "volatile" refers to solvents having a boiling point at one atmosphere of 260°C or less, preferably 250°C or less, more preferably 230°C or less, most preferably 225°C or less. In addition, the boiling point for the volatile solvent will generally be at least about 50°C preferably at least about 100°C. The term "nonvolatile" shall refer to solvents which have a boiling point at one atmosphere of greater

than 260°C. The solvent should also be acceptable for topical application to the hair and skin (i.e., no undue irritation, sensitization or other reactions are induced by the solvent).

The term, "polymer", as used herein, shall include materials whether made by polymerization of one type of monomer or made by two (*i.e.*, copolymers) or more types of monomers.

The term, "powder", as used herein, includes fine and coarse powders, flakes, crystalline flakes, precipitates, and other fine solid materials.

The term "substantially free", as used herein, means that the ingredients are either absent from the composition or they are only present in trace amounts.

The term, "water soluble", as used herein, means that the polymer is soluble in water. In general, the polymer should be soluble at 25°C at a concentration of 0.1% by weight of the water solvent, preferably at 1%, more preferably at 5%, more preferably at 15%.

### Film Forming Polymer

The compositions comprise one or more copolymers of silicone and ethylenically unsaturated monomers such as acrylic acid, methacrylic acid or their simple esters. The film forming polymers may be natural or synthetic, or a combination of both, and may be in the form of solids, semi-solids, or liquids. The film forming polymer may be neutral or ionic in character, e.g. anionic, cationic, nonionic, or amphoteric.

### Synthetic Polymers

Suitable synthetic polymers include homopolymers, copolymers, and block and graft copolymers comprised of repeating monomers such as acrylic or methacrylic acid or esters thereof, urethanes, esters, amides, styrene, vinyl, silicon, and so on. The synthetic polymers may be present in the composition in ranges from 0.1-95%, preferably 1-85%, more preferably 3-45% by weight of the total composition.

Examples of synthetic film forming polymers include those set forth in the CTFA Cosmetic Ingredient Dictionary and Handbook, Eighth Edition, 2000, pages 1744 through 1747.

#### a. Silicone Resins

Cross-linked silicones, also known as silicone resins, are suitable for use in the compositions and method of the invention. Preferred silicone resins have the general formula:



wherein R, R' and R'' are each independently a C<sub>1-10</sub> straight or branched chain alkyl or phenyl, and x and y are such that the ratio of (RR'R'')<sub>3</sub>SiO<sub>1/2</sub> units to SiO<sub>2</sub> units is 0.5 to 1 to 1.5 to 1.

5 Preferably R, R' and R'' are a C<sub>1-6</sub> alkyl, and more preferably are methyl and x and y are such that the ratio of (CH<sub>3</sub>)<sub>3</sub>SiO<sub>1/2</sub> units to SiO<sub>2</sub> units is 0.75 to 1. Most preferred is this trimethylsiloxy silicate containing 2.4 to 2.9 weight percent hydroxyl groups which is formed by the reaction of the sodium salt of silicic acid, chlorotrimethylsilane, and isopropyl alcohol. The manufacture of trimethylsiloxy silicate is set forth in U.S. Pat. Nos. 2,676,182; 3,541,205;  
10 and 3,836,437. Trimethylsiloxy silicate as described is available from Momentive Performance Materials under trade name SR1000, or, if desired in a blend of trimethylsiloxy silicate and volatile silicone from Dow Corning Corporation under the trade name 749 Fluid which contains about 40-60% volatile silicone and about 40-60% trimethylsiloxy silicate.

#### 15 **b. Copolymers of Silicone and Organic Monomers**

Also suitable a film forming polymers are copolymers of silicone and various organic, ethylenically unsaturated monomers, and optionally other monomers. Examples of such polymers are disclosed in U.S. Pat. No. 6,033,650. Preferred examples of these polymers include graft or block copolymers comprised of silicon moieties and C<sub>1-12</sub> alkyl acrylate or  
20 methacrylate monomers which may be substituted with one or more groups such as halogen or hydroxy, also referred to as silicone/acrylate copolymers. Suitable silicone acrylate copolymers may be purchased from 3M Company under the trade names VS-70 and SA-70, or from Shin Etsu Silicones.

Particular examples of suitable silicone acrylate copolymers include, without  
25 limitation, those having the INCI names Butyl Acrylate/Hydroxypropyl Dimethicone Acrylate Copolymer (CTFA Monograph ID 12998), Acrylates/Dimethicone Copolymer (CTFA Monograph ID 10082), Acrylates/Ethylhexyl Acrylate/Dimethicone Methacrylate Copolymer (CTFA Monograph ID 16592), and combinations thereof, etc. In a preferred embodiment, the acrylate film former selected from the group consisting of Butyl Acrylate/Hydroxypropyl  
30 Dimethicone Acrylate Copolymer (CTFA Monograph ID 12998), Acrylates/Dimethicone Copolymer (CTFA Monograph ID 10082), and combinations thereof.

#### **c. Urethane Homo- and Copolymers**

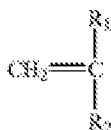
Also suitable are homo and copolymers of urethane. Homopolymers of urethane are often sold in an aqueous dispersion from vendors such as Alloid Colloids, B.F. Goodrich, and the like. Suitable urethane copolymers may be comprised of urethane monomers copolymerized with organic compounds, or other synthetic monomers.

#### 5 **d. Amides and Amines**

Also suitable are various synthetic polymers containing amide or amine substituent groups. Examples of such polymers include nylon, ammonium polyacrylate, acrylamides copolymer, acrylates/acrylamide copolymers, acrylates ammonium acrylate copolymer, acrylates C<sub>10-20</sub> alkyl acrylate cross polymer, acrylates/carbamate crosspolymer, acrylates  
 10 ceteth-20 itaconate copolymer, acrylates/dimethylaminoethyl methacrylate copolymer, ammonium acrylates copolymer, ammonium polyacrylate, ammonium styrene/acrylates copolymer, ammonium vinyl acetate/acrylates copolymer, aminomethylpropanol/acrylates/dimethylaminoethylmethacrylate copolymer, and so on.

#### **e. Other Synthetic Polymers**

15 Other suitable synthetic polymers are comprised of one or more monomers selected from the following general formula:



wherein R<sub>1</sub> is H, a C<sub>1-30</sub> straight or branched chain alkyl, aryl, aralkyl; R<sub>2</sub> is a pyrrolidone, or a  
 20 substituted or unsubstituted aromatic, alicyclic, or bicyclic ring where the substituents are C<sub>1-30</sub> straight or branched chain alkyl, or COOM wherein M is H, a C<sub>1-30</sub> straight or branched chain alkyl, pyrrolidone, or a substituted or unsubstituted aromatic, alicyclic, or bicyclic ring where the substituents are C<sub>1-30</sub> straight or branched chain alkyl which may be substituted with one or more halogens.

25 The synthetic polymers may comprise polar monomers such as acrylic acid or methacrylic acid, in combination with C<sub>1-6</sub> esters thereof. Most preferred is a synthetic polymer which comprises monomers of butyl methacrylate and acrylic acid.

#### **Natural Polymers**

30 A variety of natural polymers, or derivatives thereof are suitable, including cellulose, chitins, chitosans, shellac, rosins, resins, animal or vegetable proteins and polypeptides, and so

on. The natural polymers may be present in ranges from 0.1-95%, preferably 1-85%, more preferably 3-45% by weight of the total composition.

#### **a. Cellulosics**

5 Examples of suitable cellulosic polymers include nitrocellulose, mono- or diesters of cellulose formed by the reaction of cellulose with various organic acids, for example straight or branched chain carboxylic acids having from one to twenty, preferably one to ten carbon atoms, which may be substituted with one or more hydroxyl groups, Examples of such cellulosics include cellulose acetate, cellulose acetate isobutyrate, cellulose acetate propionate, cellulose acetate propionate carboxylate. Also suitable are cellulose polymers prepared by  
10 reacting with groups such as hydroxyl, alkoxyalkyl, hydroxylalkyl where the alkoxyalkyl and alkyl groups have from about one to ten carbon atoms. Examples of such polymers are carboxymethyl hydroxyethylcellulose, carboxymethylcellulose, ethyl cellulose, hydroxyethylcellulose, methyl ethylcellulose, hydroxypropylcellulose, hydroxylbutyl cellulose, hydroxybutyl methylcellulose, and so on.

#### **b. Chitin or Chitosan**

15 Chitins, or chitosan and derivatives thereof are also suitable natural film forming polymers for use in the compositions and method of the invention. Chitin is defined as a polysaccharide derived from the exoskeleton of marine invertebrates which contains chiefly N-acetyl-glucosamine residues. Chitosan is chitin that has been deacetylated. Both polymers  
20 may be used as is, or esterified to form mono-, di-, or triesters by reacting with various straight or branched chain organic acids having from one to thirty carbon atoms, alpha or beta hydroxy acids, or di- or tricarboxylic acids. Examples of chitin or chitosan esters include chitosan adipate, chitosan ascorbate, chitosan formate, chitosan glycolate, chitosan lactate, chitsan PCA, chitosan salicylate, chitosan succinamate, and so forth. Also suitable are simple  
25 derivatives of chitin or chitosan, which are formed by substituting moieties such as hydroxyl, C1-6alkoxy, and the like on the polymer. Examples of such derivatives include carboxylbutyl chitosan, carboxymethyl chitosan, carboxyethyl chitosan, carboxylbutyl chitosan, and so on.

#### **c. Proteins**

30 Also suitable as film forming polymers are various animal and vegetable proteins including hydrolyzed animal protein, albumin, serum albumin, hydrolyzed wheat protein, hydrolyzed soy protein, hydrolyzed animal collagen, and mixtures thereof.

#### **d. Dextrans**

Also suitable are dextrans and alkoxy, or alkoxyalkyl derivatives thereof such as carboxymethyl dextran, carboxylethyl dextran, and so on.

#### **e. Rosins, Resins and Gums**

Also suitable are various natural resins and rosins and derivatives thereof such as  
5 Balsam Canada resin, hydrogenated rosin, glycol rosin, shellac, and the like. Various gums are also suitable including acacia gum, and similar materials.

It may be desirable to have more than one film forming polymer in the composition. They polymers may be a combination of one or more synthetic polymers, or one or more natural polymers, or mixtures of both.

10 Generally, the film former is present in an amount from about 0.1% to about 85% by total weight of the composition. Typically, the film former is present from about 1% to about 75% by weight, more typically between about 5% and about 50%, and preferably, between about 10% and about 45% by weight, based on the total weight of the composition. These ranges also apply to combination of two or more different film formers.

15

#### **Solvent System**

Film forming polymers discussed herein are typically dissolved in a volatile solvent, such as methyl trimethicone, isododecane, dimethylsiloxane, cyclodimethicone pentamer/hexamer, or the like. These solutions are generally thin and flowable, so additional  
20 thickeners, such as waxes, are added to formulate systems which are easily applied to the skin or hair.

It has been surprisingly found that film forming polymers, and particularly silicone acrylate polymers, form thickened systems when dissolved in volatile hydrocarbon solvents derived from vegetable oil or other sustainable feedstocks (naturally derived). Preferred  
25 solvents are volatile alkanes or esters sourced from vegetable oils such as coconut oil or palm oil. Specifically, coconut alkane (and) coco-caprylate/caprate (INCI name) is a preferred solvent for forming thickened cosmetic systems including silicone acrylate polymers. Such systems are contemplated to impart both water and oil transfer resistance. Furthermore, they are capable of incorporating shine enhancers to form shiny transfer-resistant compositions.  
30 The coconut alkane (and) coco-caprylate/caprate solvent is commercially available from, for example, Grant Industries, under the trade name Vegelight 1214LC. Other naturally derived solvents such as soy methyl ester, sold under the trade name SoyGuard® may also be included.

Alternatively, when formulated according to the process described herein, solvents such as methyl trimethicone, isododecane, dimethylsiloxane, cyclodimethicone pentamer/hexamer, or the like may be used with little, or no, wax in the system.

5 The compositions obtained in accordance with the invention do not have a brittle texture. Rather, they can be removed easily with the finger by adherence to it and they do not have a stringy texture.

In one embodiment, the silicone acrylate polymers are formed in a pre-mix with the naturally derived volatile solvent. As used herein, the term "pre-mix" means that the ingredients are combined together prior to their combination with other ingredients contained  
10 in the cosmetic composition.

The naturally derived volatile solvent is present in the amount of from about 5% to about 50%, more preferably from about 15% to about 40%, and most preferably from about 25% to about 30% by weight of the cosmetic composition.

#### 15 **Particulate Colorant Component**

The composition may include a particulate colorant. As used herein, the term "colorant" generally refers to a color extender, dye, pigment, lake, toner, other agent, or a combination thereof, used to impart a color to a material, and includes inorganic, organic, water-soluble and water-insoluble substances.

20 The colorant may comprise, for example, an inorganic pigment. Exemplary inorganic pigments include, but are not limited to, metal oxides and metal hydroxides such as magnesium oxide, magnesium hydroxide, calcium oxide, calcium hydroxides, aluminum oxide, aluminum hydroxide, iron oxides, red iron oxide, yellow iron oxide, black iron oxide, iron hydroxides, titanium dioxide, titanium lower oxides, zirconium oxides, chromium oxides,  
25 chromium hydroxides, manganese oxides, cobalt oxides, cerium oxides, nickel oxides and zinc oxides and composite oxides and composite hydroxides such as iron titanate, cobalt titanate and cobalt aluminate. Non-metal oxides such as alumina and silica, ultramarine blue (i.e., sodium aluminum silicate containing sulfur), Prussian blue, manganese violet, bismuth oxychloride, talc, mica, sericite, magnesium carbonate, calcium carbonate, magnesium  
30 silicate, aluminum magnesium silicate, silica, titanated mica, iron oxide titanated mica, bismuth oxychloride, and the like, are also contemplated to be suitable inorganic pigments.

The colorant may comprise, for example, an organic pigment. Organic pigments can include, but are not limited to, at least one of carbon black, carmine, phthalocyanine blue and

green pigment, diarylide yellow and orange pigments, and azo-type red and yellow pigments such as toluidine red, litho red, naphthol red and brown pigments, and combinations thereof.

The colorant component may comprise, for example, one or more dyes, toners or lakes. Lakes generally refer to a colorant prepared from a water-soluble organic dye (e.g., D&C or FD&C) which has been precipitated onto an insoluble reactive or adsorptive substratum or diluent. The term "D&C" means drug and cosmetic colorants that are approved for use in drugs and cosmetics by the FDA. The term "FD&C" means food, drug, and cosmetic colorants which are approved for use in foods, drugs, and cosmetics by the FDA. Certified D&C and FD&C colorants are listed in 21 C.F.R. § 74. 101 et seq. and include the FD&C colors Blue 1, Blue 2, Green 3, Orange B, Citrus Red 2, Red 3, Red 4, Red 40, Yellow 5, Yellow 6, Blue 1, Blue 2; Orange B, Citrus Red 2; and the D&C colors Blue 4, Blue 9, Green 5, Green 6, Green 8, Orange 4, Orange 5, Orange 1, Orange 11, Red 6, Red 7, Red 17, Red 21, Red 22, Red 27, Red 28, Red 30, Red 31, Red 33, Red 34, Red 36, Red 39, Violet 2, Yellow 7, Yellow 8, Yellow 10, Yellow 11, Blue 4, Blue 6, Green 5, Green 6, Green 8, Orange 4, Orange 5, Orange 10, Orange 11, and so on.

Substrates suitable for forming lakes include, without limitation, mica, bismuth oxychloride, sericite, alumina, aluminum, copper, bronze, silver, calcium, zirconium, barium, and strontium, titanated mica, fumed silica, spherical silica, polymethylmethacrylate (PMMA), micronized teflon, boron nitride, acrylate copolymers, aluminum silicate, aluminum starch octenylsuccinate, bentonite, calcium silicate, cellulose, chalk, corn starch, diatomaceous earth, fuller's earth, glyceryl starch, hectorite, hydrated silica, kaolin, magnesium aluminum silicate, magnesium trisilicate, maltodextrin, montmorillonite, microcrystalline cellulose, rice starch, silica, talc, mica, titanium dioxide, zinc laurate, zinc myristate, zinc rosinate, alumina, attapulgite, calcium carbonate, calcium silicate, dextran, nylon, silica silylate, silk powder, sericite, soy flour, tin oxide, titanium hydroxide, trimagnesium phosphate, walnut shell powder, and mixtures thereof.

Suitable lakes include, without limitation, those of red dyes from the monoazo, disazo, fluoran, xanthene, or indigoid families, such as Red 4, 6, 7, 17, 21, 22, 27, 28, 30, 31, 33, 34, 36, and Red 40; lakes of yellow pyrazole, monoazo, fluoran, xanthene, quinoline, dyes or salt thereof, such as Yellow 5, 6, 7, 8, 10, and 11; lakes of violet dyes including those from the anthroquinone family, such as Violet 2 as well as lakes of orange dyes, including Orange 4, 5, 10, 11, and the like. Suitable Lakes of D&C and FD&C dyes are defined in 21 C.F.R. § 82.51.

In one embodiment, a cosmetic composition as described herein comprises a total of about 0.1% to about 75% by weight of the particulate colorant component, based on the total weight of the composition. Typically, the particulate colorant component will comprise from about 0.5% to about 50% by weight, more typically from about 1% to about 40% by weight, and preferably from about 2% to about 30% by weight of the total composition. In other embodiments the particulate colorant component will comprise from about 3% to about 25% by weight, more typically from about 4% to about 15% by weight, and preferably from about 5% to about 10% by weight of the total composition.

### **Cosmetically Acceptable Carrier**

The compositions comprise a cosmetically acceptable carrier. By "cosmetically acceptable" is meant that the carrier is safe for contact with human skin. It is contemplated that any cosmetically acceptable carrier known in the art will be useful. The carrier may comprise water, hydrophobic, and/or hydrophilic solvents.

Suitable hydrophilic solvents include but are not limited to, water, isopropyl alcohol, ethyl alcohol, glycerin, butylene glycol, propylene glycol, pentylene glycol, caprylyl glycol, polyglycerol diisostearate, dimethylsiloxane/glycol copolymer, isopropyl myristate, triisostearyl citrate, or any combinations thereof. Suitable hydrophobic carriers include volatile or non-volatile hydrocarbon oils, silicones, fatty ester oils, and the like.

The compositions may comprise at least one high evaporation rate solvent in combination with at least one medium evaporation rate solvent and/or at least one slow evaporation rate solvent. As used herein, a high evaporation rate solvent may be characterized as a solvent that exhibits about 20% to about 40% weight loss at 35°C over 60 minutes and/or about 40% to about 50% weight loss at 35°C over 120 minutes. A medium evaporation rate solvent may be characterized as a solvent that exhibits about 10% to about 15% weight loss at 35°C over 60 minutes and/or about 20% to about 30% weight loss at 35°C over 120 minutes. A slow evaporation rate solvent may be characterized as a solvent that exhibits less than about 10% weight loss at 35°C over 60 minutes and/or about 5% to about 15% weight loss at 35°C over 120 minutes. Non-limiting example of high evaporation rate solvents include hexamethyl disiloxane and/or a silicone fluid having a viscosity of less than 1 cSt at 25°C, including, for example, those silicone fluids having a viscosity of 0.65 cSt. A non-limiting example of a medium evaporation rate solvent includes mixed dimethicones, e.g., a dimethicone/

trisiloxane blend. Non-limiting examples of slow evaporation rate solvents include cyclopentasiloxane, methyl trimethicone, and isododecane.

The compositions of the invention may, in some embodiments, be provided as anhydrous formulations. By "anhydrous" is meant that the weight percentage of water in the composition is less than about 1% by weight. Preferably, the anhydrous compositions are substantially free of water by which is meant that water is not deliberately added to the compositions and the level of water is no more than would be expected based on the absorption of water from the air.

The carrier may comprise from about 5% to about 90% by weight of the composition, typically from about 30% and about 80% by weight, and more typically from about 50 % and about 70 % by weight of the composition.

#### **Solvent Extraction Process**

Silicone acrylate polymers are not typically provided in the absence of a solvent, commercially. Therefore, in one embodiment, the silicone acrylate polymers herein are separated from a commercial solvent according to the process hereinafter:

- (1) A 2000ml evaporation flask containing over 500gm of KP-550 solution, from Shin-Etsu, is attached to an evaporator, such as a Rocket™ evaporator from Thermo Scientific™, to evaporate the isododecane solvent from the solution.
- (2) A water bath temperature is set at 60°C; under vacuum at 500mbar; flask rotation at 150rpm; and the RotaCool, from Huber USA Inc., cooling system is set at about -10°C.
- (3) The evaporation process takes place over a time period of about 7.0 hours, and during this time period the temperature is gradually increased to 85°C, at a generally uniform rate over the 7.0 hour period. The vacuum is gradually reduced to 5mbar, generally uniformly over the 7.0 hour period. And the flask rotation increased to 280rpm, generally uniformly over the 7.0 hour period. The cooling system maintained at -10°C.
- (4) Approximately 52.0% of the isododecane solvent is typically extracted at the end of this process. As KP-550 comprises 60% isododecane, this leaves about 8% isododecane to be removed from the system.

(5) Any remaining solvent maybe extracted by placing the flask to drain into a Pyrex® tray placed in, for example, an Isotemp™ oven from Fisher Scientific™ and heating to 110°C for about 3.0 to 4.0 hours.

5 (6) The resulting product obtained is fairly brittle silicone acrylate polymer powder that can be solubilized by the naturally derived volatile solvents discussed herein.

Notably, the above process may be used to extract silicone acrylate powder from other commercially available solutions comprising volatile solvents such as Dow Corning® FA 4002 ID silicone acrylate polymer blend.

10 The ratio of the resultant dried silicone acrylate polymer powder to the volatile solvents herein may range from about 3:1 to about 1:1. Preferably the ratio is about 11:9.

### **Other Ingredients**

#### **Shine Agents**

The cosmetic compositions of the invention may optionally include one or more agents  
15 that provide or enhance shine. Shine enhancing agents will typically have a refractive index greater than about 1.4, preferably greater than about 1.5 when measured as a film at 25°C. Suitable shine enhancing agents include without limitation, polyols, fatty esters, silicone oils, phenylpropyldimethylsiloxysilicale, polybutene, polyisobutene, hydrogenated polyisobutene, hydrogenated polycyclopentadiene, propyl phenyl silsesquioxane resins; lauryl methicone  
20 copolyol, perfluorononyl dimethicone, dimethicone/trisiloxane, methyl trimethicone, and combinations thereof. In one embodiment, the composition will comprise a shine-enhancing agent in an amount from about 0.1 % to about 10% by weight, more preferably from about 1% to about 5% by weight, based on the total weight of the composition.

#### **Waxes**

25 The cosmetic compositions may optionally include one or more waxes. The one or more waxes can be natural (e.g., vegetable, animal, or mineral) waxes or synthetic waxes (e.g., polyolefin, Fisher Tropsch, etc.). A preferred wax is microcrystalline waxes, which will preferably be composed of C<sub>4</sub> to C<sub>50</sub> hydrocarbons and will have a melting point preferably greater than about 60°C. Other waxes that may be mentioned include, without limitation,  
30 glyceryl iribehenate, candelilla, carnuaba, ozokerite, paraffin, polyethylene, beeswax, ceresin, hydrogenated castor oil, Japan wax, and mixtures thereof. In one embodiment, the amount of wax is less than about 2% of the total weight of the composition. In another embodiment, the amount of wax ranges from about 0.1% to less than about 2% by weight based on the total

weight of the composition. However, more wax can be used if clarity is not a concern. For example, a lip stick may comprise wax from about 5% to about 25% by weight based on the weight of the composition.

#### **Pigments and Fillers**

5           The cosmetic compositions may optionally further comprise various other pigments, pearlescents, dyes, lakes, and fillers, as is customary in a given product. These include, without limitation, metal oxide pigment such as iron oxides and titanium dioxide, silica, alumina, nylon powder, Teflon powder, PMMA, silicone elastomers, and the like. For other pigments, lakes and dyes used in cosmetic industry, refer to the Cosmetic Ingredient  
10 Dictionary (INCI) and Handbook, 12th Edition (2008), published by the Cosmetic, Toiletry, and Fragrance Association (CTFA). Such additional pigments, fillers and the like will typically comprise from about 0.1 % to about 20% by weight of the composition, more typically from about 0.8% to about 10% by weight of the composition.

#### **Other Film Formers**

15           In addition to the film formers of the invention, which act synergistically with the solvent system herein to provide a thickened transfer-resistant composition, other water-soluble, water-dispersible, or water-insoluble film formers, including film forming polymers, may be employed. The term film-forming polymer may be understood to indicate a polymer which is capable, by itself or in the presence of at least one auxiliary film-forming agent, of  
20 forming a continuous film which adheres to a surface.

          Polymeric film formers include, without limitation, acrylic polymers or copolymers, acrylates, polyolefins, polyvinyls, polacrylates, polyurethanes, silicones, polyamides, polyethers, polyesters, fluoropolymers, polyethers, poly-acetals, polycarbonates, polyamides, polyimides, rubbers, epoxies, formaldehyde resins, organosiloxanes, dimethicones,  
25 methicones, cellulosics, polysaccharides, polyquaterniums, and the like. Suitable film formers include those listed in the Cosmetic Ingredient Dictionary (INCI Handbook, 12th Edition (2008)).

#### **Emulsions**

          The compositions may be formulated as water-in-oil (W/O) emulsions, oil-in-water  
30 (O/W) emulsions, water-in-silicone, silicone-in-water emulsions, and the like. These emulsions comprise a continuous phase and a discontinuous phase. The continuous phase may be aqueous, oil-based, or silicone-based and the discontinuous phase may likewise be aqueous,

oil-based, or silicone-based, depending on the nature of the continuous phase. Combined oil and silicone phases are also possible.

The oil phase may comprise any of the hydrophobic oils, including, without limitation, vegetable oils; fatty acid esters; fatty alcohols; isoparaffins such as isododecane; silicone oils  
5 such as dimethicones, cyclic silicones, and polysiloxanes; hydrocarbon oils such as mineral oil, petrolatum, isoeicosane and polyisobutene; natural or synthetic waxes; and the like.

The emulsions will typically comprise an amount of emulsifier sufficient to stabilize the emulsion. The amount of emulsifier will typically be from about 0.001% to about 20%, but preferably will range from about 0.01% to about 10%, and most preferably about 0.1% to  
10 about 5%, based upon the total weight of the composition.

#### **Emollients**

The cosmetic compositions may optionally comprise one or more emollients in an amount from about 0.1 % up to about 20% by weight, based on the total weight of the composition. More typically, emollients will be present in an amount from about 2% to about  
15 15%, preferably, about 5%. Emollients useful in the present invention include any known to the art, including, but not limited to, oils and esters, such as lanolin and petrolatum. Other emollients include jojoba oil, lanolin oil, coconut oil, palm kernel glycerides, grape seed oil, evening primrose oil, sesame oil, castor oil, meadowfoam seed oil, emu oil, dimethicone copolyol meadowfoamate, wheat germ oil, macadamia nut oil, avocado oil, and mixtures  
20 thereof.

#### **Thickeners**

The composition may comprise an additional thickener depending on the desired use of the composition. Suitable thickeners include those such as vegetable gums, carboxymethyl cellulose, silica, additional acrylic acid polymers, clays, such as hectorites, bentonites,  
25 hydrated magnesium and aluminum silicates, or calcium silicates, or the like. When present, thickeners will comprise from about 0.1 % to about 15% by weight of the composition, more typically from about 1% to about 5% by weight of the composition.

#### **Other Ingredients**

The compositions may include other ingredients such as one or more anesthetics, anti-  
30 allergenics, antifungals, anti-inflammatories, antimicrobials, antiseptics, chelating agents, emollients, emulsifiers, fragrances, humectants, lubricants, masking agents, medicaments, moisturizers, pH adjusters, preservatives, protectants, soothing agents, stabilizers, sunscreens, surfactants, thickeners, viscosifiers, vitamins, or any combinations thereof.

In addition, the compositions may comprise other ingredients and additives known in the art, depending on the purpose for which the cosmetic is intended. For example, a composition described herein may optionally include one or more functional agents, fillers and fragrances.

5           The compositions according to the invention may be useful in a variety of cosmetic and personal care products, including without limitation, lipsticks, and lip colors, lip gloss, mascaras, transfer-resistant foundations, eyeliner, eye shadow, water-proof sunscreens and insect repellents, skin care products, hair care products, antiperspirants and deodorants, and other cosmetic products where transfer resistant films are desired.

10           In one embodiment, the invention is formulated in a conventional lipstick or lip color product and may include, without limitation, any of the components disclosed in U.S. Patent No. 6,509,009, U.S. Patent No. 6,428,797, U.S. Patent No. 6,261,576, U.S. Patent No. 5,747,017, U.S. Patent No. 5,318,775, and U.S. Patent No. 4,935,228.

15           The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as “40 mm” is intended to mean “about 40 mm.”

20           Where a range of values is recited, it is to be understood that each intervening integer value, and each fraction thereof, between the recited upper and lower limits of that range is also specifically disclosed, along with each subrange between such values. The upper and lower limits of any range can independently be included in or excluded from the range, and each range where neither or both limits are included is also encompassed within the invention. Where a value being discussed has inherent limits, for example where a component can be  
25           present at a concentration of from 0 to 100%, or where the pH of an aqueous solution can range from 1 to 14, those inherent limits are specifically disclosed. Where a value is explicitly recited, it is to be understood that values which are about the same quantity or amount as the recited value are also within the scope of the invention, as are ranges based thereon. Where a combination is disclosed, each subcombination of the elements of that combination is also  
30           specifically disclosed and is within the scope of the invention. Conversely, where different elements or groups of elements are disclosed, combinations thereof are also disclosed. Where any element of an invention is disclosed as having a plurality of alternatives, examples of that invention in which each alternative is excluded singly or in any combination with the other

alternatives are also hereby disclosed; more than one element of an invention can have such exclusions, and all combinations of elements having such exclusions are hereby disclosed.

Every document cited herein, including any cross referenced or related patent or application is hereby incorporated herein by reference in its entirety unless expressly excluded or otherwise limited. The citation of any document is not an admission that it is prior art with respect to any invention disclosed or claimed herein or that it alone, or in any combination with any other reference or references, teaches, suggests or discloses any such invention. Further, to the extent that any meaning or definition of a term in this document conflicts with any meaning or definition of the same term in a document incorporated by reference, the meaning or definition assigned to that term in this document shall govern.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

EXAMPLES

The invention is illustrated by the following specific examples.

The examples below illustrate the general rheological results exhibited by pre-mixtures containing varying levels of acrylate polymers and volatile solvents. The most desirable physical state for each formula is one that is a “Firm Moldable Gel”. Such a physical state allows for the greatest variety of cosmetic applications. References to “dried polymers from extraction” means that the acrylate polymer was extracted according to the process described hereinbefore.

POLYMER /SOLVENT USED	PERCENTAGES / CONCENTRATION												
	66.67	66.67	40.00	55.00	55.00					45.00	70.00	66.00	
DRY SILICONE ACRYLATE POWDER <sup>1</sup>													
SHIN-ETSU KP-550 DRIED POLYMER FROM EXTRACTION									55.00				
DOW						40.00	45.00	50.00					

CORNING FA4002 ID DRIED POLYMER FROM EXTRACTIO N												
VEGELIGHT 1214 LC-EL		33.33	60.00	45.00		60.00	55.00	50.00	45.00	55.00	30.00	34.00
PERMETHYL 99AD (ISODODECA NE)	33.33				45.00							
PHYSICAL STATE OF FORMULA	Firm Mold- able Gel	Firm Mold- Able Gel	Fluid Liquid	Very Viscou s Liquid (Like Honey )	Very Viscou s Liquid (Like Honey )	Fluid Liquid	Soft Gel	Semi Firm Non- mold- able Gel	Very Viscou s Liquid (Like Honey )	Viscous Liquid	Firm Mold- able Gel	Firm Mold- able Gel

1 Available from Shin-Etsu

### Formula Examples

The examples below are formulated by mixing the silicone modified acryl resin (powder) with the coconut alkanes/coco-caprylate/caprates components to form a pre-mix.

- 5 Then, the remaining ingredients are mixed together to form a cosmetic composition, such as a lipstick.

Ingredients	Percent by weight of composition					
	1	2	3	4	5	6
<b>Example</b>						
Silicone Acrylate Powder <sup>2</sup>	40	42	45	38	0	42
Silicone Acrylate Powder <sup>3</sup>		0	0		35	0
Coconut Alkanes/ Coco-Caprylate/Caprates <sup>4</sup>	25	18	25	31	35	0
Isododecane	5	0	0	0	0	34
Ethyl Trisiloxane <sup>5</sup>	18	20	0	0	0	0
Trisiloxane <sup>6</sup>	0	0	20	16	16	17
Wax	4	3	0	4	2	3
Dye	2	2	2	2	2	2
Disteardimonium Hectorite	0.5	0.6	0.6	0.5	0.5	0.6
Coco-Caprylate/Caprates	0.4	0.4	0.4	0.5	0.4	0.4
Phenoxyethanol	0.4	0.4	0.4	0.4	0.4	0.4
Polysilicone-11/Isododecane	0	0	0	4	0	0
Filler	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.

2 Extracted from KP-550 from Shin-Etsu

3 Extracted from Dow Corning® FA 4002 ID

4 Vegelight 1214LC from Grant Industries

10 5 Silsoft ETS from Momentive

6 Xiameter PMX from Dow Corning

What is claimed is:

1. A transfer-resistant cosmetic composition comprising:
  - a) at least one silicone acrylate powder;
  - b) wherein said silicone acrylate powder is dissolved in at least one volatile solvent; and
  - c) a carrier;wherein said silicone acrylate polymer powder and said volatile solvent are present at a ratio of from about 3:1 to about 1:1.
2. A cosmetic composition according to claim 1, wherein said volatile solvent is naturally derived.
3. A cosmetic composition according to claim 2, wherein said volatile solvent comprises coconut alkane and caprylate/caprate.
4. A cosmetic composition according to claim 1, further comprising a particulate colorant.
5. A cosmetic composition according to claim 4, wherein said particulate colorant is selected from the group consisting of a color extender, dye, pigment, lake, toner, and combinations thereof.
6. A cosmetic composition according to claim 1, wherein said volatile solvent is sourced from a vegetable oil feedstock.
7. A cosmetic composition according to claim 1, further comprising one or more ingredients selected from the group consisting of shine agents, waxes, pigments, fillers, additional film formers, emollients, thickeners, anesthetics, anti-allergenic, antifungals, anti-inflammatories, antimicrobials, antiseptics, chelating agents, emollients, emulsifiers, fragrances, humectants, lubricants, masking agents, medicaments, moisturizers, pH adjusters, preservatives, protectants, soothing agents,

stabilizers, sunscreens, surfactants, thickeners, viscosifiers, vitamins, and combinations thereof.

8. A cosmetic composition according to claim 1, wherein said composition is in the form of an emulsion.
9. A cosmetic composition according to claim 1, wherein said silicone acrylate powder is present at a level of from about 0.1% to about 85% by weight of the composition.
10. A cosmetic composition according to claim 1, wherein said composition comprises less than about 10% by weight of the composition of one or more solvents selected from the group consisting of methyl trimethicone, dimethylsiloxane, cyclodimethicone pentamer/hexamer, and combinations thereof.
11. A cosmetic composition according to claim 1, wherein said silicone acrylate powder and said volatile solvent are formed in a pre-mix to form a thickened system prior to the addition of other ingredients.
12. A cosmetic composition according to claim 1, wherein said composition is substantially free of wax.

## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2016/036892****A. CLASSIFICATION OF SUBJECT MATTER****A61K 8/81(2006.01)I, A61K 8/89(2006.01)I, A61K 8/891(2006.01)I, A61K 8/92(2006.01)I, A61K 8/06(2006.01)I, A61Q 19/00(2006.01)I**

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 8/81; A61K 8/89; A01N 59/16; A61K 8/895; A61K 7/025; A61Q 17/04; A01N 59/02; A61K 7/11; A61K 33/24; A61K 8/891; A61K 8/92; A61K 8/06; A61Q 19/00

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

Korean utility models and applications for utility models  
Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords: silicone acrylate copolymer, volatile solvent, carrier, cosmetic, transfer-resistant

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013-0171078 A1 (LAWSON, CLEMENT) 04 July 2013 See paragraphs [0047], [0059]-[0061], [0067] and [0090]; and claims 1, 5-6 and 8-11.	1-12
A	WO 2011-056332 A1 (AVON PRODUCTS, INC.) 12 May 2011 See paragraph [0067]; claim 1-3, 7, 12, and 27; and table 3.	1-12
A	US 6458390 B1 (MANELSKI, JEAN MARIE et al.) 01 October 2002 See abstract; and claims 1 and 12.	1-12
A	US 2007-0009446 A1 (ROMERO, CHERYL L.) 11 January 2007 See paragraphs [0018] and [0021]; and claims 1-2.	1-12
A	US 2004-0161395 A1 (PATIL, ANJALI ABHIMANYU et al.) 19 August 2004 See abstract; paragraph [0239]; and claims 1 and 15.	1-12

 Further documents are listed in the continuation of Box C. See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

19 September 2016 (19.09.2016)

Date of mailing of the international search report

**20 September 2016 (20.09.2016)**

Name and mailing address of the ISA/KR

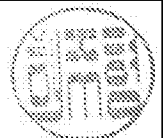
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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2016/036892**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013-0171078 A1	04/07/2013	WO 2013-003459 A2 WO 2013-003459 A3	03/01/2013 11/04/2013
WO 2011-056332 A1	12/05/2011	AR 078922 A1 CA 2778044 A1 EP 2498612 A1 TW 201127415 A US 2012-0269754 A1	14/12/2011 12/05/2011 19/09/2012 16/08/2011 25/10/2012
US 6458390 B1	01/10/2002	WO 2003-011034 A1	13/02/2003
US 2007-0009446 A1	11/01/2007	AU 2006-269550 A1 AU 2006-269550 B2 CA 2612257 A1 EP 1904021 A1 EP 1904021 A4 JP 2009-500450 A JP 5303270 B2 KR 10-0970806 B1 KR 10-2008-0031385 A US 8282947 B2 WO 2007-008458 A1	18/01/2007 21/01/2010 18/01/2007 02/04/2008 08/06/2011 08/01/2009 02/10/2013 16/07/2010 08/04/2008 09/10/2012 18/01/2007
US 2004-0161395 A1	19/08/2004	WO 2004-073626 A2 WO 2004-073626 A3	02/09/2004 04/11/2004