

CLAIMS

We claim:

1) A water-containing anti-frizz composition comprising:

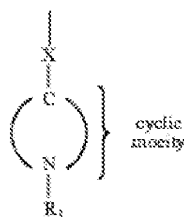
a) about 3.0% or more, by weight, of a polysiloxane fluid component selected
5 from one or more of:

i) an amodimethicone component, and

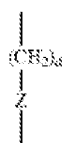
ii) a polysiloxane component comprising a plurality of hindered amine
side chains, and

b) water.

10 2) The composition of claim 1 wherein said hindered amine side chains have
the general formula, pendant from an Si atom in the polysiloxane side chain:



wherein R_1 is an H, OH, or a C_1 - C_5 hydrocarbon; X is a C_1 - C_{10} hydrocarbon, a
heteroatom or



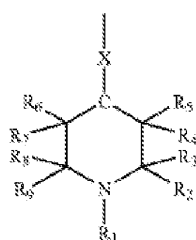
15

wherein Z is a heteroatom and d is 0 to about 6.

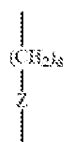
3) The composition of claim 2 wherein the cyclic moiety comprises a piperidinyl
or pyrrolidinyl moiety.

20

4) The composition of claim 1 wherein said plurality of side chains has the following structure:



5 wherein $R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8$ and R_9 are independently an H, a C_1 - C_{10} hydrocarbon, an ester, carboxyl or a halogen, and X is a C_1 - C_{10} hydrocarbon, a heteroatom, or



wherein Z is a heteroatom and d is 0 to about 6.

10

5) The composition of claim 3 wherein said polysiloxane fluid component comprises a propoxytetramethyl piperidiny dimethicone component.

6) The composition of claim 1 wherein said polysiloxane fluid component comprises an amodimethicone component.

15

7) A water-containing anti-frizz composition comprising:

a) about 2.5% or more, by weight, of a polysiloxane fluid component selected from one or more of:

20

i) an amodimethicone component,

ii) a polysiloxane component comprising a plurality of hindered amine side chains, and

b) a silicone-compatible, volatile or non-volatile liquid carrier component, and

c) water.

8) The composition of any preceding claim comprising an alkylsiloxysilicate component.

5

9) The composition of claim 8 wherein the alkylsiloxysilicate component comprises a compound selected from the group consisting of a trimethylsiloxysilicate component, a phenylpropyldimethylsiloxysilicate component, and mixtures thereof.

10) The composition of claim 8 wherein the alkylsiloxysilicate component comprises a trimethylsiloxysilicate component.

11) The composition of claim 10 wherein said trimethylsiloxysilicate component is comprised in a trimethylsiloxysilicate-based resin silicone polymer.

15

12) The composition according to any of claims 7-11 wherein the silicone-compatible, volatile or non-volatile liquid carrier comprises a component selected from the group consisting of: a siloxy component; a hydrocarbon; and an alcohol.

13) The composition of claim 12 wherein the siloxy component comprises a low molecular weight component selected from one or more of: a dimethicone, a dimethiconol, a phenyl methicone, a phenyl methiconol, a phenyl trimethicone, a diphenyl dimethicone, a phenyl dimethicone, a diphenylsiloxy phenyl trimethicone, a hexamethylsiloxane, a disiloxane, a trisiloxane, cyclotetrasiloxane, cyclopentasiloxane, cyclohexasiloxane.

14) The composition according to any preceding claim which comprises:
(d) a non-volatile component comprising a component selected from the group consisting of a dimethicone component, a dimethiconol component and a phenyl silicone component.

15) The composition according to any preceding claim which further comprises one or more components selected from the group consisting of a colorant component, a hair

shine ingredient, a sunscreen ingredient, an aesthetic modifier component, an essential oil component, a botanical component, a scent component, a nucleic acid component, a specialty extract component and a vitamin.

5 16) The composition according to any preceding claim which further comprises an aesthetic modifier component selected from the group consisting of a thickener component, a preservative component, a fragrance component, a pH adjustment component, a plasticizer component, an appearance modifier, and an anti-oxidant component.

10 17) The composition according to any preceding claim which further comprises one or more component selected from the group consisting of: an essential oil component, a botanical component, a scent component, a nucleic acid component, a specialty extract component and a vitamin.

15 18) The composition of any preceding claim wherein
 a) said polysiloxane component comprises a propoxytetramethyl piperidinyl dimethicone component, and
 b) said silicone-compatible, volatile or non-volatile liquid carrier component comprises a component selected from the group consisting of a dimethicone, a
20 dimethiconol, a phenyl methicone, a phenyl methiconol, a phenyl trimethicone, a diphenyl dimethicone, a phenyl dimethicone, and a diphenylsiloxyl phenyl trimethicone, a hexamethylsiloxane, a disiloxane, a trisiloxane, cyclotetrasiloxane, cyclopentasiloxane, cyclohexasiloxane, and a mixture of two or more of these components.

25 19) The composition of any preceding claim wherein the composition comprises one or more fatty quaternary ammonium salt, fatty amine and/or fatty alcohol.

 20) The composition of claim 19 wherein the composition comprises one or more of the following ingredients: cetrimonium chloride, stearyltrimethylammonium chloride,
30 behentrimonium chloride (also known as docosyltrimethylammonium chloride), behentrimonium methosulfate, dicetyldimonium chloride (also known as diceyl dimethyl ammonium chloride), hydroxypropyltrimonium chloride, ricinoleamidopropyltrimonium

chloride ricinoleamidopropyltrimonium ethosulfate, ricinoleamidopropyltrimonium methosulfate, saffloweramidopropyl ethyldimonium ethosulfate, quaternized stearamidopropyl amine, lauryl alcohol, cetyl alcohol, stearyl alcohol, behenyl alcohol, and derivatives of any of these.

5

21) The composition of any preceding claim containing one or more water-soluble thickener.

22) The composition of claim 21 wherein the water-soluble thickener is one or
10 more component selected from the group consisting of cellulose-based thickeners, guar gums, cassia gums, locust bean gums, xanthan gums, acacia senegal gums, caesalpina spinosa gums, a clay, acrylamidopropyltrimonium chloride/acrylates copolymers, derivatized and underivatized carbomers, an organically modified clay, such as quaternized clays, and mixtures thereof.

15

23) The composition according to any preceding claim which, when applied to frizzy hair and permitted to dry, causes a reduction in hair frizz at 80° F and 80% humidity relative to untreated frizzy hair of at least 70% under the same temperature and humidity conditions.

20

24) The composition of claim 23 wherein the reduction in hair frizz of tresses treated with said composition is at least 80% relative to untreated frizzy hair under the same temperature and humidity conditions.

25

25) A cationic oil-in-water anti-frizz emulsion comprising:

25

a) a polysiloxane fluid component selected from one or more of:

i) an amodimethicone component, and

ii) a polysiloxane component comprising a plurality of hindered amine side chains,

30

b) an optional silicone-compatible, volatile or non-volatile liquid carrier

component,

c) an optional alkylsiloxysilicate component, and

d) water.

26) The emulsion of claim 25 comprising a component selected from the group consisting of a quaternary ammonium fatty salt and a fatty amine.

5

27) The emulsion of either claim 25 or claim 26 wherein said polysiloxane fluid component comprises an alkoxytetramethyl piperidinyl dimethicone.

28) The emulsion of any of claims 25, 26 or 27 wherein said polysiloxane fluid
10 component comprises a trimethylsiloxysilicate component.

29) A non-ionic oil-in-water emulsion comprising:

a) about 3.0% or more, by weight, of a polysiloxane fluid component selected from the group consisting of:

15

i) an amodimethicone, and

ii) a polysiloxane component comprising a plurality of hindered amine side chains,

b) an optional a silicone-compatible, volatile or non-volatile liquid carrier component,

20

c) a fatty alcohol or non-ionic derivative thereof, and

d) water.

30) The emulsion of claim 29 wherein the polysiloxane fluid component comprises propoxytetramethyl piperidinyl dimethicone.

25

31) The emulsion of either of claims 29 or 30 wherein said fatty alcohol or non-ionic derivative comprises a fatty ether of a polyethylene glycol.

32) The emulsion of any of claims 29-31 comprising a fatty alcohol.

30

33) The emulsion of any of claims 29-32 comprising a polymer comprising acrylodimethyltaurate subunits.

34) The emulsion of any of claims 29-33 wherein comprising hydroxyethyl
5 acrylate/acrylodimethyltaurate copolymer.

35) A method of making the oil-in-water emulsion of any of claims 29-34, comprising the steps:

A) mixing together the hydrophobic ingredients together at a temperature higher
10 than the melting temperature of the emulsion ingredient having the highest melting temperature to form a Phase A;

B) mixing together, in a separate container, water and other hydrophilic emulsion ingredients, if present, until uniform to form a Phase B;

C) adding to and mixing with Phase A about 10 %(wt) of a liquid selected from the
15 group consisting of: a) water, and b) Phase B to form a uniform, thick water-in-oil paste;

D) slowly adding the remaining amount of Phase B to the water-in-oil emulsion with homogenization to invert the emulsion from a water-in-oil emulsion to a nonionic oil-in-water emulsion.

36) The method of claim 35 in which Phase B consists of water.

20 37) A non-ionic water-in-oil anti-frizz emulsion comprising:

a) about 3.0% or more, by weight, of a polysiloxane fluid component selected from the group consisting of:

i) an amodimethicone, and

25 ii) a polysiloxane component comprising a plurality of hindered amine side chains,

a) an optional silicone-compatible, volatile or non-volatile liquid carrier component,

b) a non-ionic fatty alcohol, and

c) water.

38) The water-in-oil emulsion of claim 37, comprising one or more component each independently selected from the group consisting of: a nonionic emulsifier and a water-soluble thickener.

5 39) The water-in-oil emulsion of either of claims 37 or 38 comprising one or more component each independently selected from the group consisting of: a detangling aid, a hair shine ingredient, a humectant, a sunscreen ingredient, a fragrance component, a plasticizer component, an antioxidant component, an essential oil, a nucleic acid, a protein, an amino acid and a vitamin.

10

40) A method of making the water-in-oil emulsion of any of claims 37-39, comprising

A) mixing together the hydrophobic ingredients together at a temperature higher than the melting temperature of the emulsion ingredient having the highest melting

15

temperature to form a Phase A;

B) mixing together, in a separate container, water and other hydrophilic ingredients, if present, until uniform to form a Phase B;

C) slowly adding Phase B to Phase A with mixing to form a uniform water-in-oil emulsion.

20

41) The method of claim 40 wherein said mixing comprising homogenization sufficient to reduce the average size of the aqueous droplets to a diameter below 1000 μm .

42) A method of reducing or preventing hair frizz, comprising the steps:

I) applying to hair a water-containing composition comprising

25

a) at least about 3.0%, by weight, of a polysiloxane fluid component selected from the group consisting of:

i) an amodimethicone, and

ii) a polysiloxane component comprising a plurality of hindered amine side chains, and

- b) an optional silicone-compatible, volatile or non-volatile liquid carrier component;
and
- c) water, and

II) distributing said composition along a plurality of hair shafts.

5

43) A method of reducing or preventing hair frizz, comprising the steps:

I) applying to hair a flowable composition comprising the composition
of any of claims 1 to 39, and

II) distributing said composition along a plurality of hair shafts.

10

44) A method according to claim 43 which, when applied to frizzy hair and permitted to dry, causes a reduction in hair frizz after incubation at 80° F and 80% humidity for 6 hours as compared to the hair frizz of untreated, otherwise identical frizzy hair incubated under identical conditions.

15

45) Use of a composition as defined in any one of claims 1 to 39 to reduce hair frizz by applying the composition to frizzy hair, said reduction being measured relative to untreated, otherwise identical frizzy hair after both the treated frizzy hair and the untreated frizzy hair are incubated at 80° F and 80% humidity for 6 hours.

20

46) The use of claim 45 wherein the reduction in hair frizz is at least 70%, as measured by digital image analysis of said treated frizzy hair and said untreated frizzy hair at the end of said 6 hour time period.

25

47) The use of claim 45 wherein said polysiloxane fluid component comprises polysiloxane component comprising a plurality of hindered amine side chains.

48) The use of claim 45 wherein said polysiloxane fluid component comprises a propoxytetramethyl piperidinyl dimethicone component.

30

49) The use of any of claims 45, 47 and 48 wherein the silicone-compatible, volatile or non-volatile liquid carrier comprises a component selected from the group consisting of a volatile siloxy component, a volatile hydrocarbon and a volatile alcohol.

- 5 50) The use of any of claims 45 or 47-49 wherein the silicone-compatible, volatile or non-volatile liquid carrier comprises a low molecular weight, volatile siloxy component.

51) The use of any of claims 45 or 47-50 wherein the polysiloxane fluid component comprises a polysiloxane component comprising an amodimethicone.

10

52) The method of claim 51 wherein said amodimethicone comprises a component selected from the group consisting of: a trimethyl silylamodimethicone component and an aminopropyl dimethicone component.

- 15 53) The method of any of claims 45 or 47-52 wherein the composition comprises a trimethylsiloxysilicate component.

54) The method of claim 53 wherein said trimethylsiloxysilicate component is comprised in a trimethylsiloxysilicate-based resin silicone polymer.

20