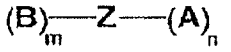
LIQ 103 PCT

1. A method for bleaching hair comprising:

(a) applying to the hair a first formulation comprising a bleaching agent; and

(b) applying to the hair a second formulation comprising an active agent,

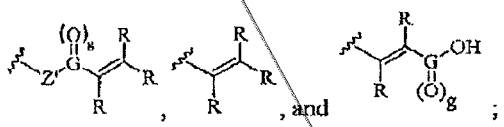
wherein the active agent contains at least one ionizable functional group and at least one functional group capable of forming a covalent bond with a thiol and having the formula:



wherein Z is a linker or is absent;

m and n are each an integer independently selected from 0-6, and the sum of m+n is equal to or greater than 2;

B is a functional group capable of forming a covalent bond with a thiol and B is independently selected from the group consisting of:



wherein R is independently selected from the group consisting of hydrogen, C_{1-6} alkyl groups, aryl groups, and ionizable functional groups and Z' is oxygen (O), NH or is absent, and G is carbon (C) and g is 1, or G is sulfur (S) and g is 2;

A is an ionizable functional group which is independently selected from the group consisting of: -COOH, $-SO_3H$, $-PO_3H_2$, $-N(R^1)_2$, $-N(R^1)_3$; wherein R^1 is independently selected from the group consisting of a hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocycloalkyl and heteroaryl groups; wherein each R^1 is independently unsubstituted or substituted with one or more substituents;

wherein the linker Z, if present, is an alkyl group, alkenyl group, cycloalkyl group, cycloalkenyl group, aryl group, heterocycloalkyl group, or heteroaryl group; and

wherein step (a) occurs simultaneously with step (b).

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2. The method of claim 1,

wherein the alkyl, alkenyl, cycloalkyl, cycloalkenyl, aryl, heterocycloalkyl, or heteroaryl group of the linker Z is unsubstituted or substituted one or more times by a halogen, cyano, alkoxy, alkyl, alkenyl, cycloalkyl, cycloalkenyl, aryl, heterocycloalkyl, heteroaryl, amine, hydroxy, oxo, formyl, acyl, carboxylic acid (-COOH), $-C(O)R^1$, $-C(O)OR^1$, ($-COO^-$), primary amide ($-CONH_2$), secondary amide ($-CONHR^1$), $-C(O)NR^1R^2$, $-NR^1R^2$, $-NR^1S(O)_2R^2$, $-NR^1C(O)R^2$, $-S(O)_2R^2$, $-SR^1$, $-S(O)_2NR^1R^2$, $-SOR^1$, or $-SOOR^1$;

wherein R^1 and R^2 are each independently selected from the group consisting of a hydrogen, alkyl group, alkenyl group, alkynyl group, cycloalkyl group, aryl group, heterocycloalkyl , and heteroaryl group, wherein each of R^1 and R^2 is independently unsubstituted or substituted with one or more substituents.

3. The method of any one of claims 1-2, wherein the linker Z is a C_{1-4} alkyl group.

4. The method of claim 3, wherein the alkyl group is substituted with one or more substituents replacing a hydrogen on one or more carbons of the alkyl hydrocarbon backbone or the alkyl group is substituted with one or more heteroatoms within the hydrocarbon carbon backbone, or a combination thereof, and

wherein the substituents are selected from the group consisting of oxo, hydroxyl, carboxyl, amido, and amino groups.

5. The method of claim 1, wherein the first formulation further comprises a reducing agent, wherein the reducing agent is selected from the group consisting of thioglycolic acid and its derivative salts and esters, thiolactic acid and its derivative salts and esters, cysteine and its derivatives, cysteamine and its derivatives, inorganic sulfites, sodium metabisulfite, other inorganic bisulfites, dithiothreitol, dithioerythritol, organic phosphines, and Japanese relaxers.

6. The method of any preceding claim, wherein the second formulation further comprises one or more cosmetically acceptable excipients selected from the group consisting of water, surfactants, vitamins, natural extracts,

preservatives, chelating agents, perfumes, preservatives, antioxidants, proteins, amino acids, humectants, fragrances, emollients, penetrants, thickeners, viscosity modifiers, hair fixatives, film formers, emulsifiers, opacifying agents, propellants, liquid vehicles, carriers, salts, pH adjusting agents, neutralizing agents, buffers, hair conditioning agents, anti-static agents, anti-frizz agents, anti-dandruff agents, and combinations thereof.

7. The method of any preceding claim, wherein the active agent is present in an amount ranging from about 0.01 wt% to about 10 wt% of the second formulation.

8. The method of any preceding claim, wherein the active agent is present in an amount ranging from about 0.5 to 3 wt% of the second formulation.

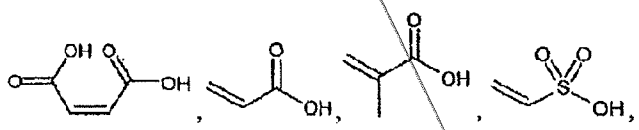
9. The method of any preceding claim, wherein the formulation is in the form of a liquid, a gel, a cream, or a lotion.

10. The method of any preceding claim, wherein step (b) is repeated one or more times.

11. The method of any preceding claim, further comprising:

(c) rinsing, shampooing, and/or conditioning the hair, wherein step (c) occurs subsequent to step (b).

12. The method of any preceding claim, wherein the active agent is selected from the group consisting of:



and simple salts thereof.

13. The method of any preceding claim, wherein the first formulation and the second formulation are mixed at the time of use and prior to application.

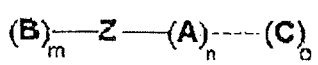
14. A method for bleaching hair comprising:

(a) applying to the hair a first formulation comprising a bleaching agent; and

(b) applying to the hair a formulation comprising an active agent,

wherein the active agent contains at least one ionizable functional group and at least one functional group capable of forming a

covalent bond with a thiol and having the formula:

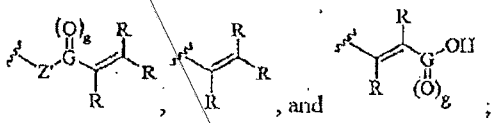


Formula II

wherein Z is a linker or is absent;

m and n are each an integer independently selected from 0-6, and the sum of m+n is equal to or greater than 2;

B is a functional group capable of forming a covalent bond with a thiol and B is independently selected from the group consisting of:



wherein R is independently selected from the group consisting of hydrogen, C_{1-6} alkyl groups, aryl groups, and ionizable functional groups and Z' is oxygen (O), NH or is absent, and G is carbon (C) and g is 1, or G is sulfur (S) and g is 2;

A is an ionizable functional group which is independently selected from the group consisting of: -COOH, $-SO_3H$, $-PO_3H_2$, $-N(R^1)_2$, $-N(R^1)_3$; wherein R^1 is independently selected from the group consisting of a hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, heterocycloalkyl and heteroaryl groups; wherein each R^1 is independently unsubstituted or substituted with one or more substituents;

C contains an ionic group and a functional group capable of forming a covalent bond with a nucleophile, such as a thiol, and has a charge opposite to that of the ionizable group A and o is an integer value independently selected from 0-6, such that the sum of charges of C and A is zero; and

wherein the linker Z, if present, is an alkyl group, alkenyl group, cycloalkyl group, cycloalkenyl group, aryl group, heterocycloalkyl group, or heteroaryl group.

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15. The method of claim 14,

wherein the alkyl, alkenyl, cycloalkyl, cycloalkenyl, aryl, heterocycloalkyl, or heteroaryl group of the linker Z is unsubstituted or substituted one or more times by a halogen, cyano, alkoxy, alkyl, alkenyl, cycloalkyl, cycloalkenyl, aryl, heterocycloalkyl, heteroaryl, amine, hydroxy, oxo, formyl, acyl, carboxylic acid (-COOH), $-C(O)R^1$, $-C(O)OR^1$, ($-COO^-$), primary amide (*e.g.*, $-CONH_2$), secondary amide (*e.g.*, $-CONHR^1$), $-C(O)NR^1R^2$, $-NR^1R^2$, $-NR^1S(O)_2R^2$, $-NR^1C(O)R^2$, $-S(O)_2R^2$, $-SR^1$, $-S(O)_2NR^1R^2$, $-SOR^1$, or $-SOOR^1$;

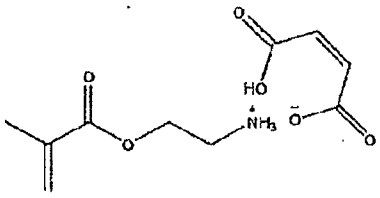
wherein R^1 and R^2 are each independently selected from the group consisting of a hydrogen, alkyl group, alkenyl group, alkynyl group, cycloalkyl group, aryl group, heterocycloalkyl , and heteroaryl group, wherein each of R^1 and R^2 is independently unsubstituted or substituted with one or more substituents.

16. The method of claim 15, wherein the linker Z is a C_{1-4} alkyl group.

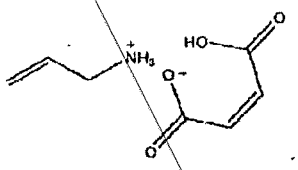
17. The method of claim 16, wherein the alkyl group is substituted with one or more substituents replacing a hydrogen on one or more carbons of the alkyl hydrocarbon backbone or the alkyl group is substituted with one or more heteroatoms within the hydrocarbon carbon backbone, or a combination thereof, and

wherein the substituents are selected from the group consisting of oxo, hydroxyl, carboxyl, amido, and amino groups.

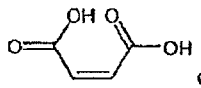
18. The method of any one of claims 13-17, wherein the active agent is:



or



19. The method of any one of claims 1-11, wherein the active agent is:



or simple salts thereof.

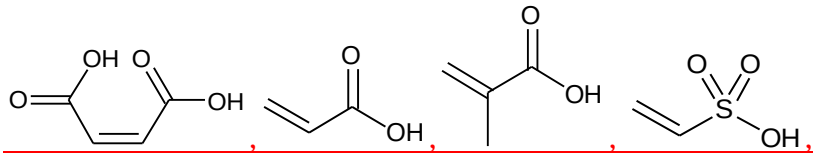
We claim:

1. A method for bleaching hair comprising:

(a) applying to the hair a first formulation comprising a bleaching agent; and

(b) applying to the hair a second formulation comprising an active agent,

wherein the active agent is selected from the group consisting of:



and simple salts thereof, and

wherein step (a) occurs simultaneously with step (b).

2. The method of claim 1, wherein the second formulation further comprises one or more cosmetically acceptable excipients selected from the group consisting of water, surfactants, vitamins, natural extracts, preservatives, chelating agents, perfumes, preservatives, antioxidants, proteins, amino acids, humectants, fragrances, emollients, penetrants, thickeners, viscosity modifiers, hair fixatives, film formers, emulsifiers, opacifying agents, propellants, liquid vehicles, carriers, salts, pH adjusting agents, neutralizing agents, buffers, hair conditioning agents, anti-static agents, anti-frizz agents, anti-dandruff agents, and combinations thereof.

3. The method of any one of claims 1-2, wherein the active agent is present in an amount ranging from about 0.01 wt% to about 10 wt% of the second formulation.

4. The method of claim 3, wherein the active agent is present in an amount ranging from about 0.5 to 3 wt% of the second formulation.

5. The method of any one of claims 1-2, wherein the active agent is present in an amount ranging from about 0.1 wt% to about 50 wt% of the second formulation.

6. The method of any one of claims 1-2, wherein the active agent is present in an amount

ranging from about 0.1 wt% to about 5 wt% of the second formulation.

7. The method of any one of claims 1-6, wherein the formulation is in the form of a liquid, a gel, a cream, or a lotion.

8. The method of any one of claims 1-7, wherein step (b) is repeated one or more times.

9. The method of any one of claims 1-8, further comprising:

(c) rinsing, shampooing, and/or conditioning the hair, wherein step (c) occurs subsequent to step (b).

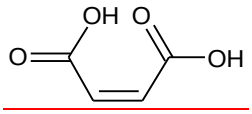
10. The method of any one of claims 1-10, wherein the first formulation and the second formulation are mixed at the time of use and prior to application.

11. A method for bleaching hair comprising:

(a) applying to the hair a first formulation comprising a bleaching agent; and

(b) applying to the hair a second formulation comprising an active agent,

wherein the active agent is:



or simple salts thereof, and

wherein step (a) occurs simultaneously with step (b).

12. The method of claim 11, wherein the active agent is present in an amount ranging from about 0.01 wt% to about 10 wt% of the second formulation.

13. The method of claim 12, wherein the active agent is present in an amount ranging from about 0.5 to 3 wt% of the second formulation.

14. The method of claim 11, wherein the active agent is present in an amount ranging from

about 0.1 wt% to about 50 wt% of the second formulation.

15. The method of claim 11, wherein the active agent is present in an amount ranging from about 0.1 wt% to about 5 wt% of the second formulation.

16. The method of any one of claims 11-15, wherein the second formulation further comprises one or more cosmetically acceptable excipients selected from the group consisting of water, surfactants, vitamins, natural extracts, preservatives, chelating agents, perfumes, preservatives, antioxidants, proteins, amino acids, humectants, fragrances, emollients, penetrants, thickeners, viscosity modifiers, hair fixatives, film formers, emulsifiers, opacifying agents, propellants, liquid vehicles, carriers, salts, pH adjusting agents, neutralizing agents, buffers, hair conditioning agents, anti-static agents, anti-frizz agents, anti-dandruff agents, and combinations thereof.