It is also of advantage that the formula of step (a) is mixed into a commercially available hair colouring or hair bleaching formulation prior to the application to hair. On the other hand, the formula of step (b) can be mixed with a commercially available hair coloring formulation.

It is also advisable that prior to the application of step (a) the hair is treated with a thioglycolic acid containing hair care composition for permanent wave treatment.

SUMMARY OF THE INVENTION

Described herein is a method for strengthening and/or repairing hair comprising the steps of: (a) applying a hair care composition to hair, wherein the hair care composition comprises an at least bi-functional Brønsted-base of the general formula X-R-Y, wherein X and Y are proton-acceptor groups and R is an organic spacer comprising 1 to 20 carbon atoms, and 0 to 5 oxygen atoms, and 0 to 5 nitrogen atoms, and X-R-Y having a molecular weight of less than 500 g/mol, and leaving the caustic hair strengthening composition on for 1 to 45 minutes, (b) optionally rinsing, shampoo'ing and/or drying the hair drying, (c) applying to the hair a formula comprising a crosslinking composition comprising an at least bi-functional organic acid capable of reacting with the amine groups of the hair, and leaving the caustic hair strengthening composition on for 1 to 45 minutes, (d) optionally rinsing, shampoo'ing and/or drying the hair, characterized in that the composition of step (a) has a pH of 7 to 12, and the composition of step (c) has a pH of 1.5 to 7. Optionally, the hair strengthening composition of step (a) can be mixed into commercially available hair colouring or hair bleaching formulations prior to the application. When applied without prior mixing into either a commercially available hair colouring or bleaching formulation the hair strengthening method can be altered such that the hair strengthening composition of step (c) is applied before hair strengthening composition of step (a) is.

DETAILED DESCRIPTION OF THE INVENTION

In this document, including in all embodiments of all aspects of the present invention, the following definitions apply unless specifically stated otherwise. All percentages are by weight of the total composition. All ratios are weight ratios. References to 'parts' e.g. a mixture of 1 part X and 3 parts Y, is a ratio by weight. "QS" or "QSP" means sufficient quantity for 100% or for 100g. +/- indicates the standard deviation. All ranges are inclusive and combinable. The number of significant digits conveys neither a limitation on the indicated amounts nor on the accuracy of

CLAIMS

What is claimed is:

1. A method for strengthening hair, the method comprising the steps of:

   a) applying to the hair a first formulation which contains an at least one bi-functional Brönsted-base of the general formula X-R-Y, wherein X and Y are independently selected from the groups of primary amino, carboxylate, nitrate, hydrogenphosphate, phosphate, sulfate and carbonate and R is an organic molecule group with 1 to 20 carbon atoms, and 0 to 5 oxygen atoms, and 0 to 5 nitrogen atoms and is not an aromatic or heteroaromatic compound, and X-R-Y has a molecular weight of less than 500 g/mol, wherein the concentration of the at least bi-functional Brönsted-base is 1 - 30 %; and

   b) applying to the hair a second formulation containing at least one bi-functional organic acid capable of reacting with the amine groups of the hair, wherein the concentration of the at least one bi-functional organic acid is 1 - 30%,

   characterized in that the first formulation has a pH of 7 to 12, and the second formulation has a pH of 1.5 to 7; and

   a reduction of breakage of hair is achieved.

2. The method of claim 1, wherein the at least bi-functional Brönsted-base of the general formula X-R-Y is a mixture of 4,7,10-Trioxa-1,13-tridecanediamine, 4,9-Dioxa-1,12-dodecanediamine and 1,11-Diamino-3,6,9-trioxaundecane.

3. The method of claim 1, wherein the at least bi-functional Brönsted-base of the general formula X-R-Y is a mixture of 4,7,10-Trioxa-1,13-tridecanediamine and 4,9-Dioxa-1,12-dodecanediamine.

4. The method of claim 1, wherein the at least bi-functional Brönsted-base of the general formula X-R-Y is 4,7,10-Trioxa-1,13-tridecanediamine.

5. The method of any of the preceding claims, wherein the at least bi-functional acid is maleic acid, itaconic acid, or a mixture thereof.

6. The method of claim 1, wherein the concentration of the at least bi-functional Brönsted-base in (a) is 3-20 % and the concentration of the at least bi-functional organic acid in step (b) is 3 - 20 %.

7. The method of claim 1, wherein step (b) is performed prior to step (a).

8. The method of claim 1, wherein step (a) is performed prior to step (b).

9. The method of claim 1, wherein the at least bi-functional organic acid of step (b) is selected from the group of amide, ether, ester, amino, and acetyl derivatives of oxalic-, malonic-, succinic-, glutaric-, adipic-, pimeric-, suberic-, azelaic-, sebacic-, undecanedioic-, dodecanedioic-, methylmalonic-, methylsuccinic, 2-methylglutaric-, aspartic-, maleic-, fumaric-, itaconic-, mesaconic-, methylmaleic-, phthalic-, isophthalic-, terephthalic-, malic-, ketomalonic-, 4-ketopimelic-, citric-, isocitric-, aconitic-, propane-1,2,3-tricarboxylic-, trimesic-, methanetetracarboxylic-, ethylenetetracarboxylic-, meso-butane-1,2,3,4-tetracarboxylic-, and furantetracarboxylic- acid.

10. The method of claim 1, wherein R is having 0 nitrogen atoms.

11. The method claim 1, wherein the hair is dried between steps (a) and (b), and the drying time is 1 to 60 minutes or wherein there is a waiting time between the applications of step (a) and (b) or (b) and (a) of 1 to 60 minutes.

12. The method of claim 1, wherein the formulation of step (a) is left on the hair for 1 to 45 minutes and wherein the formulation of step (b) is left on the hair for 1 to 45 minutes.

13. The method of claim 1, wherein the formulations of steps (a) and (b) are independently mixed into a cosmetically acceptable carrier and where the cosmetically acceptable carrier of the formula of step (a) is either identical or not to the cosmetically acceptable carrier of the formula of step (b).

14. The method of claim 1, wherein the formulation of step (a) is mixed into a commercially available hair colouring or hair bleaching formulation prior to the application to the hair.

15. The method of claim 1, wherein prior to the step (a), the hair is treated with a thioglycolic acid containing a hair care composition.

16. Kit for the strengthening of hairs containing at least two separate formulations, wherein the first formulation contains an at least bifunctional Brönsted-base of the general formula X-R-Y, wherein X and Y are independently selected from the groups of primary amino, carboxylate, nitrate, hydrogenphosphate, phosphate, sulfate, carbonate and R is an organic molecule group with 1 - 20 carbon atoms, 0 to 5 oxygen atoms and 0 to 5 nitrogen atoms and is not an aromatic or heteroaromatic compound, neither substituted nor unsubstituted and X-R-Y has a molecular weight below 500 g/mol, wherein the concentration of the at least one bi-functional Brönsted-base is 1 - 30 % and wherein the second formulation contains an at least bifunctional organic acid capable of reacting with the amine groups of the hair, wherein the concentration of the at least one bi-functional organic acid is 1 - 30% and wherein the first formulation has a pH-value of 7 to 12 and the second formulation has a pH-value of 1.5 to 7; and a reduction of breakage of hair is achieved.

17. Kit for the strengthening of hairs according to claim 16, wherein the at least bi-functional Brönsted-base of the general formula X-R-Y is a mixture of 4,7,10-Trioxa-1,13-tridecanediamine, 4,9-Dioxa-1,12-dodecanediamine and 1,11-Diamino-3,6,9-trioxaundecane.

18. Kit for the strengthening of hairs according to claim 16, wherein the at least bi-functional Brönsted-base of the general formula X-R-Y is a mixture of 4,7,10-Trioxa-1,13-tridecanediamine and 4,9-Dioxa-1,12-dodecanediamine.

19. Kit for the strengthening of hairs according to claim 16, wherein the at least bi-functional Brönsted-base of the general formula X-R-Y is 4,7,10-Trioxa-1,13-tridecanediamine.

20. Kit for the strengthening of hairs according to claim 16, wherein the at least bi-functional acid is maleic acid, itaconic acid, or a mixture thereof.

21. Kit for the strengthening of hairs according to claim 16, wherein the kit further comprises a hair-conditioner.

22. Kit for the strengthening of hairs according to claim 16, wherein the concentration of the at least one bifunctional Brönsted-base in the first formulation is 3-20 % and the concentration of the at least one bi-functional organic acid in step (b) is 3 - 20 %.

23. Kit for the strengthening of hairs according to claim 16, wherein the at least bifunctional organic acid of the second formulation has been selected from the group of amide, ether, ester, amino, and acetyl derivatives of oxalic-, malonic-, succinic-, glutaric-, adipinic-, pimelic-, suberic-, azelainic-, sebacic-, undecandioic-, dodecandioic-, methylmalonic-, methylsuccinic-, 2-methylglutaric-, aspartic-, maleic-, fumaric-, itaconic-, mesaconic-, methylmaleic-, phthalic-, isophthalic-, terephthalic-, malic-, ketomalonic-, 4-ketopimelic-, citric-, isocitric-, aconitic-, propan-1,2,3-tricarboxylic-, trimesic-, methantetracarboxylic-, ethylenetetracarboxylic-, meso-butane-1,2,3,4-tetracarboxylic-, furantetracarboxyic- acid.

24. Kit for the strengthening of hairs according to claim 16, wherein the first and the second formulations further contain at least a viscosity-modifying agent, and has a viscosity of from about 0.1 mPa·s to about 1,000,000 mPa·s at 25 ℃ .

25. Kit for the strengthening of hairs according to claim 16, wherein the first and the second formulations further contain at least one emulsifier and/or a surfactant.

26. Kit for the strengthening of hairs according to claim 16, wherein the first and the second formulation further contain at least one particulate material.

27. Kit for the strengthening of hairs according to claim 16, wherein the first and the second formulation further contain at least one preservative.

28. Kit for the strengthening of hairs according to claim 16, wherein the first and the second formulations independent of each other are mixed into cosmetic acceptable substrates and wherein the cosmetic acceptable substrate of the first formulation is either identical or different from the cosmetic acceptable substrate of the second formulation.