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Process for permanently reshaping the hair using aminosilicones

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(56) Related Art
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ABSTRACT

PROCESS FOR PERMANENTLY RESHAPING THE HAIR USING AMINOSILICONES

The invention relates to a process for permanently reshaping keratin fibres, comprising the application to the keratin fibres, before the reducing operation and/or after the fixing operation, of a pre-treatment and/or post-treatment cosmetic composition comprising, in a cosmetically acceptable vehicle, an aminosilicone microemulsion, the number-average primary size of the particles in the microemulsion being between 3 and 70 nm.

AUSTRALIA

Patents Act 1990

COMPLETE SPECIFICATION

STANDARD PATENT

Applicant:

L'OREAL

Invention Title:

PROCESS FOR PERMANENTLY RESHAPING THE HAIR USING AMINOSILICONES

The following statement is a full description of this invention, including the best method of performing it known to me/us:

PROCESS FOR PERMANENTLY RESHAPING THE HAIR USING AMINOSILICONES

The present invention relates to a process for permanently reshaping keratin fibres, in particular the hair, the said process being able to be used especially in professional hairstyling salons or privately, via the marketing of kits.

For the purposes of the present invention, the expression «*permanent reshaping process*» means any long-lasting process for shaping, curling, straightening or relaxing the hair.

The expression «*keratin fibres*» in particular means the hair, the eyelashes and the eyebrows, but especially the hair.

It is known that the most common technique for obtaining a permanent reshaping of the hair consists, in a first stage, in opening the keratin -S-S- disulphide (cystine) bonds using a reducing composition containing a reducing agent (reduction step), followed, preferably after having rinsed the hair thus treated, by reconstituting, in a second stage, the said disulphide bonds by applying to the hair, which has been placed under tension beforehand (curlers and the like), an oxidizing composition (oxidizing step, also known as the fixing step) so as to finally give the hair the desired shape. This technique thus makes it equally possible either to make the hair wavy or to straighten or relax it. The new shape given to the hair by a chemical treatment such as above is remarkably long-lasting and in particular withstands the action of washing with water or shampoos, as opposed to simple standard techniques for temporary reshaping, such as hairsetting.

The reducing compositions that may be used to carry out the first step of a permanent-waving operation generally contain, as reducing agents, sulphites, bisulphites or thiols. Among the thiols that may be mentioned are cysteine and its various derivatives, cysteamine and its derivatives, thiolactic acid, thioglycolic acid and also its esters, especially glyceryl monothioglycolate, and thioglycerol.

As regards the oxidizing compositions required to carry out the fixing step, use is usually made in practice of compositions based on aqueous hydrogen peroxide solution or of alkali metal bromates.

The problem with the permanent-waving techniques known to date is that applying them repeatedly to the hair induces in the long term a gradual deterioration in the quality of the hair, and especially a gradual and pronounced deterioration in the sheen and the cosmetic properties of the hair, in particular as regards the softness of the fibres, which have a tendency to become more and more coarse, and also as regards their disentangling, the hair becoming more and more difficult to disentangle. This deterioration is also particularly pronounced when the fixing step of the permanent-waving operation is carried out using a bromate.

To limit this deterioration of the hair, it has already been proposed to introduce conditioners directly into the reducing composition. For example, Japanese patent applications H2-250814 and H9-151120 describe reducing compositions containing aminosilicones, which may optionally be in the form of a microemulsion.

However, processes for permanently reshaping the hair using such compositions are not entirely satisfactory, since the degree, the quality and liveliness of the curls are generally insufficient and short-lived, as if the conditioner, especially aminosilicones, directly combined with the reducing agent, blocked the activity of the said reducing agent.

The problem posed by the invention is that of providing a process for permanently reshaping keratin fibres, especially the hair, which reduces the degree of mechanical and/or cosmetic degradation of the hair, while at the same time providing a satisfactory degree, quality and liveliness of curls.

The Applicant has discovered, surprisingly and unexpectedly, that by applying to the hair, before applying the reducing composition and/or after having applied the oxidizing composition, at least one pre-treatment and/or post-treatment cosmetic composition containing an aminosilicone microemulsion, it is possible to solve the problem posed by the present invention.

One subject of the invention is a process for permanently reshaping keratin fibres, especially the hair, comprising at least the operations consisting in:

(i) applying a reducing composition to the keratin fibres;

(ii) oxidizing the keratin fibres,

characterized in that it also involves applying to the keratin fibres, before operation (i) and/or after operation (ii), a pre-treatment and/or post-treatment cosmetic composition comprising, in a cosmetically acceptable vehicle, an aminosilicone microemulsion, the number-average primary size of the particles in the microemulsion being between 3 and 70 nm.

Another subject of the invention relates to a kit for permanently reshaping keratin fibres, one of the compartments containing a pre-treatment and/or post-treatment cosmetic composition comprising an amino-silicone microemulsion, the number-average primary size of the particles in the microemulsion being between 3 and 70 nm.

AMINOSILICONE MICROEMULSION

For the purposes of the present invention, the expression «*aminosilicone microemulsion*» means thermodynamically stable dispersions consisting of a discontinuous phase formed by aminosilicones in a continuous phase formed by water, optionally combined with surfactants.

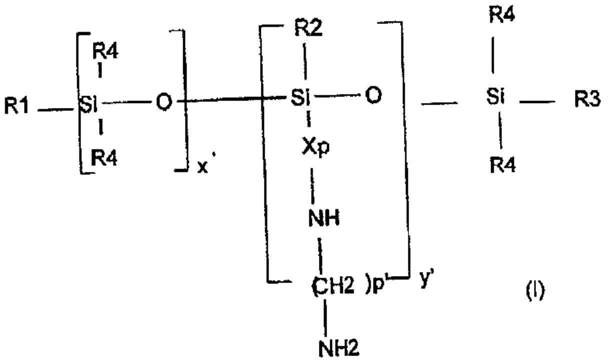
The expression «*primary size*» means the maximum size that it is possible to measure between two diametrically opposite points on the particles.

Preferably, the number-average primary size of the particles in the microemulsion is between 5 and 60 nm and even more preferably between 10 and 50 nm.

In the text hereinbelow and hereinabove, in accordance with what is generally accepted, the terms «silicone» and «polysiloxane» are understood to denote any organosilicon polymer or oligomer having a linear or cyclic, branched or crosslinked structure of variable molecular weight, obtained by polymerization and/or polycondensation of suitably functionalized silanes, and consisting essentially of a repetition of main units in which the silicon atoms are linked together by oxygen atoms (siloxane bonding ≡Si-O-Si≡), optionally substituted hydrocarbon-based radicals being linked directly via a carbon atom to the said silicon atoms. The most common hydrocarbon-based radicals are alkyl radicals, especially C_1-C_{10} alkyl radicals, and in particular methyl, fluoroalkyl radicals, aryl radicals and in particular phenyl, and alkenyl radicals and in particular vinyl; other types of radicals that can be linked, either directly or via a hydrocarbon-based radical, to the siloxane chain are, especially, hydrogen, halogens and in particular chlorine, bromine or fluorine, thiols, alkoxy radicals, polyoxyalkylene (or polyether) radicals and in particular polyoxyethylene and/or polyoxypropylene, hydroxyl or hydroxyalkyl radicals, amide groups, acyloxy or acyloxyalkyl radicals, amphoteric or betain groups, anionic groups such as carboxylates, thioglycolates, sulphosuccinates, thiosulphates, phosphates and sulphates, needless to say this list not limiting in any way («organomodified» silicones).

According to the invention, the term «amino-silicone» denotes any silicone comprising at least one primary, secondary or tertiary amine or a quaternary ammonium group. Mention may thus be made of:

(a) polysiloxanes corresponding to the formula:



$$R1-\left[\begin{array}{c}R4\\|\\Si\\|\\R4\end{array}-O\right]_{x'}-\left[\begin{array}{c}R2\\|\\Si\\|\\Xp\\|\\NH\\|\\(CH2)_{p'}\\|\\NH2\end{array}-O\right]_{y'}-\begin{array}{c}R4\\|\\Si\\|\\R4\end{array}-R3 \qquad (I)$$

in which x′ and y′ are integers depending on the molecular weight, generally such that the said weight-average molecular weight is between 5 000 and 500 000 approximately;

R1, R2 and R3, which may be identical or different, denote a hydroxyl radical, a C1 to C4 alkyl radical, a C1 to C4 alkoxy radical or a phenyl radical;

X denotes a branched or unbranched C1-C4 alkylene radical;

R4 denotes a C1-C4 alkyl or phenyl radical;

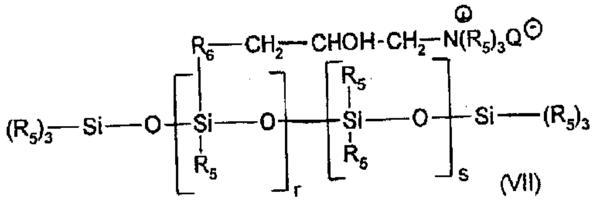
p and p′ denote, independently of each other, an integer ranging from 1 to 10.

Preferably, alkyl denotes methyl and alkoxy denotes methoxy.

Preferably, p=3, p′=2 and R4 denotes methyl and X denotes methylene.

Among these polymers, mention may be made of the compounds denoted by the name «amodimethicone» and «trimethylsilylaminodimethicone» in the CTFA dictionary.

(b) aminosilicones corresponding to the formula:



$$(R_5)_3-Si-O-\left[\underset{R_5}{\overset{R_6-CH_2-CHOH-CH_2-\overset{\oplus}{N}(R_5)_3Q^{\ominus}}{Si}}-O\right]_r-\left[\underset{R_6}{\overset{R_5}{Si}}-O\right]_s-Si-(R_5)_3$$

(VII)

in which

R_5 represents a monovalent hydrocarbon-based radical containing from 1 to 18 carbon atoms, and in particular a C_1-C_{18} alkyl radical or a C_2-C_{18} alkenyl radical, for example methyl;

R_6 represents a divalent hydrocarbon radical, especially a C_1-C_{18} alkylene radical or a C_1-C_{18} divalent alkylenoxy radical, for example a C_1-C_8 radical, linked to the Si via an SiC bond;

Q^- is an anion such as a halide ion, especially chloride, or an organic acid salt (acetate, etc.);

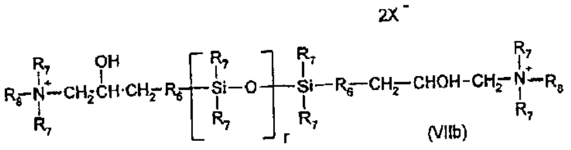
r represents a mean statistical value from 2 to 20 and in particular from 2 to 8;

s represents a mean statistical value from 20 to 200 and in particular from 20 to 50.

Such aminosilicones are described more particularly in patent US 4 185 087.

One silicone falling within this category is the silicone sold by the company Union Carbide under the name «Ucar Silicone ALE 56».

c) quaternary ammonium silicones of formula:



$$R_8-\overset{R_7}{\underset{R_7}{\overset{|}{\underset{|}{N^+}}}}-CH_2-\overset{OH}{\overset{|}{C}H}-CH_2-R_6-\left[\overset{R_7}{\underset{R_7}{\overset{|}{\underset{|}{Si}}}}-O\right]_r-\overset{R_7}{\underset{R_7}{\overset{|}{\underset{|}{Si}}}}-R_6-CH_2-CHOH-CH_2-\overset{R_7}{\underset{R_7}{\overset{|}{\underset{|}{N^+}}}}-R_8 \quad 2X^-$$

(VIIb)

in which

R_7, which may be identical or different, represent a monovalent hydrocarbon-based radical containing from 1 to 18 carbon atoms, and in particular a C_1-C_{18} alkyl radical, a C_2-C_{18} alkenyl radical or a ring comprising 5 or 6 carbon atoms, for example methyl;

R_6 represents a divalent hydrocarbon-based radical, especially a C_1-C_{18} alkylene radical or a C_1-C_{18} divalent alkylenoxy radical, for example a C_1-C_8 radical, linked to the Si via an SiC bond;

R_8, which may be identical or different, represent a hydrogen atom, a monovalent hydrocarbon-based radical containing from 1 to 18 carbon atoms, and in particular a C_1-C_{18} alkyl radical, a C_2-C_{18} alkenyl radical or a radical $-R_6-NHCOR_7$;

X^- is an anion such as a halide ion, especially chloride, or an organic acid salt (acetate, etc.);

r represents a mean statistical value from 2 to 200 and in particular from 5 to 100.

These silicones are described, for example, in patent application EP-A-0 530 974.

According to the invention, the aminosilicone that is preferably used is one:

- whose amine number is greater than 0.15 meq per gram,
- that has hydroxyl and/or alkoxy end groups.

An example of a microemulsion containing such a silicone that may be mentioned is the product sold by the company Wacker under the name Wacker Finish CT96E.

Advantageously, the concentration of aminosilicone in the pre-treatment or post-treatment composition is between 0.05% and 10% by weight relative to the total weight of this composition, and more advantageously between 0.1% and 7%.

The microemulsions in accordance with the present invention may contain solvents.

These solvents are preferably chosen from the group formed by:

- C_1-C_8 lower alcohols such as ethanol;
- glycols such as glycerol, propylene glycol, 1,3-butylene glycol, dipropylene glycol and polyethylene glycols containing from 4 to 16 and preferably from 8 to 12 ethylene oxide units.

The solvents such as those mentioned above are present in the microemulsions of the invention in concentrations preferably ranging from 0.01% to 30% by weight relative to the total weight of the emulsion.

In addition, the use of the alcohols as defined above, at concentrations of greater than or equal to 5% by weight and preferably greater than 15%, makes it possible to obtain microemulsions free of preserving agent.

The pre-treatment or post-treatment compositions containing the microemulsions used according to the invention may contain water-soluble or liposoluble active agents, having cosmetic or dermo-pharmaceutical activity. The liposoluble active agents are in the oily globules of the emulsion, whereas the water-soluble active agents are in the aqueous phase of the emulsion. Examples of active agents that may be mentioned include vitamins and derivatives thereof such as vitamin E, vitamin E acetate, vitamin C and its esters, the B vitamins, vitamin A alcohol or retinol, vitamin A acid or retinoic acid and its derivatives, provitamins such as panthenol, vitamin A palmitate, niacinamide, ergocalciferol, antioxidants, essential oils, wetting agents, silicone or non-silicone sunscreens, preserving agents, sequestering agents, pearlescent agents, pigments, moisturizers, anti-dandruff agents, anti-seborrhoeic agents, plasticizers, hydroxy acids, electrolytes and fragrances.

Preferably, the pH of the pre-treatment or post-treatment composition comprising an aminosilicone microemulsion is preferably between 2 and 10 and more preferably between 3 and 9.

The pre-treatment composition comprising an aminosilicone microemulsion is applied to the hair to be treated, which will optionally have been moistened beforehand. This application may be performed after the usual step of placing the hair under tension in a shape corresponding to the desired final shape for the said hair (for example curls), this step itself possibly being carried out by any means, especially a mechanical means, that is suitable and known per se for maintaining hair under tension, such as, for example, rollers, curlers and the like.

Advantageously, the pre-treatment or post-treatment composition comprising an aminosilicone microemulsion is left to act on the hair, at room temperature or under heat, for a period of between 1 and 60 minutes and more advantageously between 3 and 30 minutes.

According to an optional step of the process, the hair impregnated with the pre-treatment composition comprising an aminosilicone microemulsion can be rinsed, the rinsing generally being carried out using water.

In an essential step of the process according to the invention, a reducing composition is applied to the hair, the said reducing composition generally containing at least one thiol.

The thiol in the reducing composition may be chosen from thiols known as reducing agents such as, for example, thioglycolic acid, glyceryl or glycol monothioglycolate, cysteamine and its C_1-C_4 acyl derivatives such as N-acetylcysteamine or N-propionylcysteamine, cysteine, N-acetylcysteine, sugar N-mercaptoalkylamides such as N-(2-mercaptoethyl)-gluconamide, 3-mercaptopropionic acid and its derivatives, thiolactic acid and its esters such as glyceryl monothiolactate, thiomalic acid, pantethine, thioglycerol, alkali metal or alkaline-earth metal sulphites or biosulphites, the N-(mercaptoalkyl)-ω-hydroxyalkylamides described in patent application EP-A-354 835 and the N-mono- or N,N-dialkylmercapto-4-butyramides described in patent application EP-A-368 763, the aminomercaptoalkylamides described in patent application EP-A-432 000, the N-(mercaptoalkyl)-succinamic acid or N-(mercaptoalkyl)succinimide derivatives described in patent application EP-A-465 342, the alkylaminomercaptoalkylamides described in patent application EP-A-514 282, and the mixture of 2-hydroxypropyl thioglycolate and of 2-hydroxy-1-methylethyl thioglycolate described in patent application FR-A-2 679 448.

Thioglycolic acid, thiolactic acid and 3-mercaptopropionic acid are preferably used.

The reducing agents are generally present in a concentration that may be between 1% and 20% by weight relative to the total weight of the reducing composition.

The pH of the reducing composition is generally between 6 and 10 and preferably between 7 and 9.

The pH values of the reducing compositions may be conventionally adjusted by adding basifying agents such as, for example, aqueous ammonia, mono-ethanolamine, diethanolamine, triethanolamine, isopropanolamine, 1,3-propanediamine, an ammonium or alkali metal carbonate or bicarbonate, a primary, secondary or tertiary amine carbonate or bicarbonate or an organic carbonate such as guanidine carbonate, needless to say all these compounds possibly being taken alone or as a mixture.

The reducing composition may be in the form of a thickened or unthickened lotion, a cream, a gel or any other suitable form and may contain additives known for their use in reducing compositions for permanently reshaping the hair.

The reducing composition may also be of the exothermic type, that is to say of the type causing a certain level of heating during application to the hair, affording a pleasant sensation to the person on whom the permanent-waving or straightening operation is being performed.

The reducing composition may also contain a solvent such as, for example, ethanol, propanol, isopropanol or glycerol, in a maximum concentration of 20% relative to the total weight of the composition.

When the compositions are intended for a hair straightening or relaxing operation, the reducing composition is preferably in the form of a thickened cream so as to keep the hair as straight as possible. These creams are prepared in the form of «heavy» emulsions, for example based on glyceryl stearate, glycol stearate, self-emulsifying waxes, fatty alcohols, etc.

It is also possible to use liquids or gels containing thickeners such as carboxyvinyl copolymers which «stick» the hairs together and keep them in the smooth position during the exposure time.

Finally, the compositions may also be in a «self-neutralizing» or «self-regulated» form and, in this case, the reducing agents used according to the invention are combined with at least disulphide known for its use in a reducing composition for self-neutralizing permanent waving.

In a conventional manner, the hair onto which the reducing composition has been applied should be left to rest for a few minutes, generally between 2 and 40 minutes and preferably between 5 and 30 minutes, so as to allow the reducing agent sufficient time to act correctly on the hair. This waiting stage is generally carried out by leaving the treated hair to rest in the open air (at room temperature or with heating). During this waiting stage, care is generally taken to ensure that the hair does not dry out completely but instead remains humid.

The hair impregnated with the reducing composition can then be carefully rinsed, generally with water. Optionally, after rinsing, a stage of heating at high temperature for a few seconds is carried out.

Next, an oxidizing composition is applied to the hair thus rinsed, with the aim of fixing the new shape given to the hair. It may also be envisaged to leave the hair to be oxidized by the air.

The oxidizing composition contains an oxidizing agent that may be chosen from aqueous hydrogen peroxide solution, an alkali metal bromate, a persalt or a polythionate. As mentioned previously, one of the great advantages of the process according to the invention is that it is entirely suitable in the case of bromate-based oxidizing compositions. The bromate concentration in the oxidizing composition is generally between 0.1 and 2 M.

The pH of the oxidizing composition is generally between 2 and 10.

As in the case of the application of the reducing composition, the hair onto which the oxidizing composition has been applied is then, conventionally, left for a standing or waiting stage that may last a few minutes, generally between 3 and 30 minutes and preferably between 5 and 15 minutes.

The post-treatment composition comprising an aminosilicone microemulsion is preferably applied, after rinsing out the oxidizing composition, to wet or dry hair. The hair that has undergone the post-treatment may optionally be dried and/or heated and/or rinsed, before being styled. Where appropriate, the composition may be applied while the hair is maintained by a mechanical device, for instance hairsetting rollers or curlers.

Usually, the hair impregnated with the oxidizing composition is rinsed carefully, generally with water. Before or after rinsing, the keratin fibres are separated from the means required for placing them under tension.

The head of hair finally obtained has good cosmetic properties: the hair is shinier, softer and easier to disentangle or to style.

Advantageously, the pre-treatment or post-treatment composition containing an aminosilicone microemulsion is applied according to at least one of the following variants:

- to clean, wet hair, before using the means for placing the hair under tension, without rinsing the hair before applying the reducing agent;
- to wet hair after rinsing out the fixing agent, the hair being subsequently either rinsed or dried.

When the process for permanently reshaping the hair is a straightening process, it is possible, in a manner that is known per se, to use a straightening agent, generally a thiol agent or an alkaline agent.

In the case of a thiol straightening agent, the process in accordance with the invention is advantageously carried out by applying the pre-treatment or post-treatment composition containing an aminosilicone microemulsion according to at least one of the following variants:

- to clean, wet hair, without rinsing before applying the reducing agent;
- to clean, wet hair, after rinsing out the fixing agent, by rinsing before drying the hair.

In the case of an alkaline straightening agent, the process in accordance with the invention is advantageously carried out by applying the pre-treatment or post-treatment composition containing an aminosilicone microemulsion to wet hair, after rinsing out neutralizing shampoo, by rinsing before drying the hair.

In the case of a hair curling operation, the process in accordance with the invention gives lively curls and the hair is especially supple, light, silky and well separated.

In the case of a hair straightening operation, the process in accordance with the invention especially affords control of the body of the hair, makes the hair smooth from the root to the end and gives a more natural feel.

The invention may be understood more clearly with the aid of the non-limiting examples which follow, which constitute advantageous embodiments of the process according to the invention.

a.m. means active material.

EXAMPLES:

Example 1:

Use is made of a pre-treatment composition containing the aminosilicone microemulsion at 2% final weight of a.m. Wacker Finish CT96E (Wacker), the number-average primary size of the particles being 20 nm. This composition is applied to a lock of moderately sensitized, clean wet hair. The lock is passed under heat, at 60°C for 15 minutes, and then rinsed. It then undergoes a treatment with the permanent-waving product Dulcia Vital 2 ® for sensitized hair, sold by L'Oréal. The same permanent-waving treatment is applied in parallel to a lock not treated with the pre-treatment composition (prior art). The alkaline solubility and porosity measurements are collated in Table 1.

Table 1

	Alkaline solubility	Porosity
Process according to the invention	22%	55
Process according to the prior art	26%	59

It is found that the pre-treatment in accordance with the present invention has the effect of reducing the degradation of the hair, after the action of the permanent-waving product.

To measure the alkaline solubility (AS), the process is performed as follows: the hair to be analysed is treated with a solution of N/10 sodium hydroxide, heated at 65°C for 30 minutes. The alkaline solubility is the percentage by mass of hair lost during this treatment.

To measure the porosity, the process is performed as follows: the hair to be analysed is placed in a solution containing an uncharged dye (2-nitro-para-phenylenediamine), drained and then desorbed in two buffered aqueous solutions. The absorbence A of these combined desorbing solutions is measured at 470 nm. The porosity is obtained by the relationship: $100 \times A - 20$.

Example 2: A pre-treatment lotion containing 2% Wacker Finish CT96E silicone active material is used. The lotion is applied to wet hair, held in shape by curlers, and a bonnet is put on. The hair is passed under a heating hood for 5 minutes. The bonnet is removed and the hair is rinsed. The permanent-waving treatment is then applied in a conventional manner, using Dulcia Vital 2.

This process is applied to six individuals, having natural hair, in a half-head test in comparison with a permanent-waving product Dulcia Vital 2, and makes it possible to obtain an improvement in the softness, the liveliness of the curls, the bouffant appearance of the hair and the feel. As the hair undergoes shampoo washes in the course of time, the cosmetic differences are maintained for about six weeks.

Example 3: A pre-treatment lotion containing 2% of Wacker Finish CT96E silicone active material is used. The hair is left for 15 minutes under heat. A Stiff thiolactic acid hair-straightening cream is then applied. The rest of the straightening operation is carried out in a conventional manner.

This process, applied to five individuals as a half-head test in comparison with the Stiff hair-straightening agent, gives an improvement in the softness, disentangling and ease of styling, and better control of the hair's body. After several shampoo washes, the hair treated with the composition is softer and less bouffant.

Example 4: A pre-treatment lotion containing 2% of Wacker Finish CT96E silicone active material is used, on wet hair that has previously undergone a straightening treatment with Goldys without sodium hydroxide. The hair thus treated is left for 10 minutes at room temperature and the composition is then rinsed out.

This process, applied to 11 individuals with frizzy natural hair, in a half-head test in comparison with the straightening agent Goldys without sodium hydroxide, gives an improvement in the softness and disentangling and good control of the hair's body, after each shampoo wash, and the side treated with the aminosilicone composition is softer and easier to disentangle.

Example 5: A pre-treatment lotion containing 2% of Wacker Finish CT96E silicone active material is used, after rinsing out the fixing agent. The hair is placed in shape by means of blow-drying, without rinsing out this composition.

This process, applied to five individuals with very sensitized hair, in a half-head test in comparison with a standard permanent-waving product, gives an improvement in the disentangling, softness, liveliness, curliness, feel and body on the day of the application. In the six weeks following this permanent-waving operation, the curliness disappears more quickly on the side not treated with the silicone. The half-head treated with the silicone microemulsion always remains markedly softer and easier to disentangle, the hair is easier to style and is more bouffant.

For the purposes of this specification it will be clearly understood that the word "comprising" means "including but not limited to", and that the word "comprises" has a corresponding meaning.

It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Process for permanently reshaping keratin fibres, especially the hair, comprising at least the operations consisting in:

(i) applying a reducing composition to the keratin fibres;

(ii) oxidising the keratin fibres, characterised in that it also involves applying to the keratin fibres, before operation, (i) and/or after operation (ii), a pre-treatment and/or post-treatment cosmetic composition comprising, in a cosmetically acceptable vehicle, an aminosilicone microemulsion, the number-average primary size of the particles in the microemulsion being between 3 and 70 nm.

2. Process according to claim 1, characterised in that the number-average primary size of the particles in the microemulsion is between 5 and 60 nm.

3. Process according to claim 2, characterised in that the number-average primary size of the particles in the microemulsion is between 10 and 50 nm.

4. Process according to any one of the preceding claims, characterised in that the pH of the pre-treatment or post-treatment composition comprising the aminosilicone microemulsion is between 2 and 10.

5. Process according to claim 4, characterised in that the pH of the pre-treatment or post-treatment composition comprising the aminosilicone microemulsion is between 3 and 9.

6. Process according to any one of the preceding claims, characterised in that the aminosilicone concentration in the pre-treatment or post-treatment

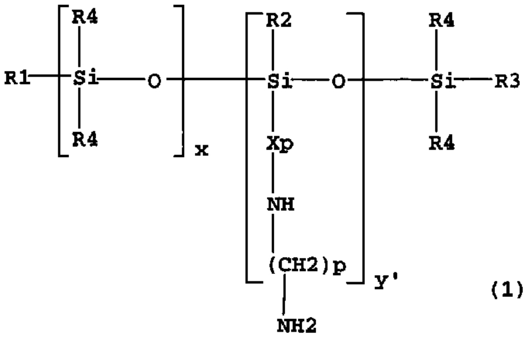
composition is between 0.05% and 10% by weight relative to the total weight of this composition.

7. Process according to claim 6, characterised in that the aminosilicone concentration in the pre-treatment or post-treatment composition is between 0.01% and 7% by weight relative to the total weight of this composition.

8. Process according to any one of the preceding claims, characterised in that the pre-treatment or post-treatment composition comprising the aminosilicone microemulsion is left to act on the hair for a period of between 1 and 60 minutes.

9. Process according to claim 8, characterised in that the pre-treatment or post-treatment composition comprising the aminosilicone microemulsion is left to act on the hair for a period of between 3 and 30 minutes.

10. Process according to any one of the preceding claims, characterised in that the aminosilicone corresponds to formula I:



$$R1-\left[\overset{R4}{\underset{R4}{Si}}-O\right]_{x}-\left[\overset{R2}{\underset{Xp-NH-(CH2)p-NH2}{Si}}-O\right]_{y'}-\overset{R4}{\underset{R4}{Si}}-R3$$

(1)

in which x' and y' are integers depending on the molecular weight, generally such that the said weight-average molecular weight is between 5000 and 500,000 approximately;

R1, R2 and R3, which may be identical or different, denote a hydroxyl radical, a C1 to C4 alkyl radical, a C1 to C4 alkoxy radical or a phenyl radical;

X denotes a branched or unbranched C1-C4 alkylene radical;

R4 denotes a C1-C4 alkyl or phenyl radical;

p and p' denote, independently of each other, an integer ranging from 1 to 10.

11. Process according to any one of the preceding claims, characterised in that an aminosilicone whose amine number is greater than 0.15 meq per gram is used.

12. Process according to any one of the preceding claims, characterised in that an aminosilicone that has hydroxyl and/or alkoxy end groups is used.

13. Process according to any one of the preceding claims, characterised in that the pre-treatment or post-treatment composition also comprises additives chosen from vitamins and derivatives thereof such as vitamin E, vitamin E acetate, vitamin C and its esters, the B vitamins, vitamin A alcohol or retinol, vitamin A acid or retinoic acid and its derivatives, provitamins such as panthenol, vitamin A palmitate, niacinamide, ergocalciferol, antioxidants, essential oils, wetting agents, silicone or non-silicone sunscreens, preserving agents, sequestering agents, pearlescent agents, pigments, moisturisers, anti-dandruff agents, anti-seborrhoeic agents, plasticisers, hydroxy acids, electrolytes and fragrances.

14. A kit for the permanent reshaping of keratin fibres, one of the compartments containing a pre-treatment and/or post-treatment cosmetic composition comprising an aminosilicone microemulsion, the number-average size of the particles in the micro-emulsion being between 3 and 70

nm when used in the process according to any one of claims 1 to 13.

15. Use of a pre-treatment and/or post-treatment cosmetic composition comprising, in a cosmetically acceptable vehicle, an aminosilicone microemulsion, the number-average size of the particles in the microemulsion being between 3 and 70 nm, for the permanent reshaping of keratin fibres.

16. Process for permanently reshaping keratin fibres, substantially as herein described with reference to the accompanying examples.

17. A kit for permanently reshaping keratin fibres, substantially as herein described with reference to the accompanying examples.

Dated this 12th day of June 2003
L'OREAL
By their Patent Attorneys
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