PROCESS FOR RELAXING OR STRAIGHTENING HAIR

Applicants: David W. CANNELL, NEW HOPE, PA (US); Cynthia Chong ESPINO, PRINCETON, NJ (US); Nghi Van NGUYEN, EDISON, NJ (US); Gilles GENAIN, PARIS (FR)

Inventors: David W. CANNELL, NEW HOPE, PA (US); Cynthia Chong ESPINO, PRINCETON, NJ (US); Nghi Van NGUYEN, EDISON, NJ (US); Gilles GENAIN, PARIS (FR)

Assignee: L'OREAL, Paris (FR)

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ABSTRACT

A process for straightening or relaxing hair involving the steps of: (a) pre-alkalizing the hair by contacting it with an alkaline composition having a pH of from about 8.0 to about 10.5 to form pre-alkalized hair; (b) optionally, rinsing the alkaline composition from the pre-alkalized hair; (c) providing a hair straightening/relaxing composition containing: (i) from about 0.1 to about 50% by weight of at least one weak non-hydroxide base; and (ii) remainder, to 100%, a cosmetically acceptable medium, all weights based on the weight of the hair straightening/relaxing composition; (d) contacting the hair with the hair straightening/relaxing composition to form treated hair; (e) optionally, rinsing the hair straightening/relaxing composition from the treated hair; (f) optionally, contacting the treated hair with a non-volatile oil; and (g) smoothing the treated hair using a combination of heat and means for physically smoothing hair.
PROCESS FOR RELAXING OR STRAIGHTENING HAIR
CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of the filing date of U.S. Non-Provisional application Ser. No. 11/717,824, filed Mar. 14, 2007, the contents of which are incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] Hair straightening or hair relaxing products have been commercially available for over fifty years for people who want straighter, more manageable hair. Most commercially available hair relaxers are composed of a strong hydroxide base that breaks the bonds in the hair.

[0003] Commercial products based only on alkaline metal hydroxides such as sodium hydroxide and lithium hydroxide are typically used to straighten or relax curly/kinky hair. There are primarily four different types of alkaline metal hydroxide hair straighteners in use: calcium hydroxide, lithium hydroxide, sodium hydroxide, and potassium hydroxide. The straightening product is usually applied quickly and can only remain in the hair for a very limited amount of time. Due to the alkalinity of such products, if the product is not rinsed from the hair at the appropriate time, damage to the hair can occur, as well as chemical burns to the scalp and areas surrounding the hair.

[0004] Thus, the object of the present invention is to provide a hair straightening or relaxing process which is safer than, yet as effective as, conventional processes.

BRIEF SUMMARY OF THE INVENTION

[0005] The present invention is directed to a process for straightening or relaxing hair involving the steps of:

[0006] (a) pre-alkalizing the hair by contacting it with an alkaline composition having a pH of from about 8.0 to about 10.5 to form pre-alkalized hair;

[0007] (b) applying onto the pre-alkalized hair a hair straightening/relaxing composition containing:

(i) from about 0.1% to about 50% by weight of at least one weak non-hydroxide base; and

(ii) remainder, to 100%, of a cosmetically acceptable medium;

[0008] (c) optionally, rinsing the hair straightening/relaxing composition from the hair;

[0009] (d) optionally, contacting the treated hair with a non-volatile oil, to form treated hair; and

[0010] (e) smoothing the treated hair using a combination of heat and means for physically smoothing hair.

DETAILED DESCRIPTION OF THE INVENTION

[0011] Other than in the operating examples, or where otherwise indicated, all numbers expressing quantities of ingredients and/or reaction conditions, are to be understood as being modified in all instances by the term “about”.

[0012] It has been surprisingly found that by employing the process of the present invention, straightening/relaxing of hair can be achieved in a manner which is less harmful to a user’s skin and hair than conventional hair straightening/relaxing processes.

[0013] Conventional products, which employ large amounts of hydroxide, have a tendency to cause skin irritation, as well as damage to the hair itself, due to the use of large amounts of hydroxide in said products. However, by first pre-alkalizing the hair, followed by treating it with a weak non-hydroxide base product, and then smoothing the hair by employing a combination of heat and means for physically smoothing the hair, satisfactory straightening/relaxing of the hair can be achieved in a manner that is less harmful to both skin and hair.

[0014] The pre-alkalizing step of the present invention involves the use of an alkaline composition having a pH ranging from about 8.0 to about 10.5, preferably from about 8.5 to about 9.5. Any conventional base, whether alkaline hydroxide or non-hydroxide, may be employed so long as it results in the formation of an alkaline composition having the above-disclosed pH range. The precise amount of conventional base used will depend on the specific base(s) chosen. Once the hair has been pre-alkalized, the alkaline composition may, optionally, be rinsed-off.

[0015] The purpose of the pre-alkalizing step is to open the hair cuticle, thereby rendering it more susceptible to the subsequent penetration of the non-hydroxide base. This in turn renders the hair straightening/relaxing process more efficient and less time-consuming.

[0016] The alkaline composition may be employed in any suitable form. Examples thereof include, but are not limited to, a shampoo, a conditioner or an alkaline solution in general. In a particularly preferred embodiment, the alkaline composition is in the form of a shampoo which would facilitate both the pre-alkalizing and cleaning of the hair at the same time.

[0017] Suitable weak non-hydroxide bases for use in the present invention are those bases having a pKa of from about 0 to about 15, preferably from about 1 to about 14, and more preferably from about 2 to about 13. These may be chosen from weak organic bases and weak inorganic bases.

[0018] Weak organic bases generally include nitrogen-containing bases which do not completely dissociate in water. Examples thereof include, but are not limited to, ethylenamines, ethylenediamines, ethanolamines, quinoline, and cyclic amines.

[0019] Examples of five-membered rings having one nitrogen include, but are not limited to, pyrrole, pyrrole, pyrrolidine, and derivatives thereof.

[0020] Examples of five-membered rings having two nitrogen include, but are not limited to, pyrazoline, imidazolidine, imidazole, imidazoline, and derivatives thereof.

[0021] Examples of six-membered rings having one nitrogen include, but are not limited to, morpholine, pyridine, piperidine, and derivatives thereof.

[0022] Examples of six-membered rings having two nitrogen include, but are not limited to, pyridazine, pyrimidine, pyrazine, piperazine, and derivatives thereof.

[0023] Examples of six-membered rings having three nitrogen include, but are not limited to, triazine, and derivatives thereof.

[0024] Particularly preferred weak organic bases include ethylenediamines, monoethanolamines, imidazole, pyrrole, and mixtures thereof.

[0025] Weak inorganic bases generally include alkali metal phosphates and carbonates such as, for example, sodium phosphate, potassium phosphate, sodium carbonate, sodium bicarbonate, potassium carbonate, potassium bicarbonate, and their derivatives.
Weak inorganic bases may also include alkali metals of carboxylates such as, for example, sodium acetate, potassium acetate, sodium citrate, and potassium citrate, and their derivatives.

Particularly preferred weak inorganic bases include potassium phosphate, sodium phosphate, and sodium carbonate.

The weak non-hydroxide base is typically employed in the hair straightening/relaxing composition in an amount of from about 0.1% to about 50% by weight, preferably from about 0.1% to about 30% by weight, preferably from about 0.1% to about 10% by weight, based on the total weight of the composition.

As used herein, the term “cosmetically acceptable medium” is known to one of ordinary skill in the art, and may comprise, for example, water and/or at least one ionic solvent.

The hair straightening/relaxing composition disclosed herein may be, for example, in the form of a thickened cream so as to hold the hair as stiff as possible. These creams are made in the form of “heavy” emulsions, for example, based on glyceryl stearate, glycol stearate, self-emulsifying waxes, fatty alcohols, mineral oil and petrolatum.

Liquids or gels containing thickeners, such as carboxyvinyl polymers or copolymers that “stick” the hairs together and hold them in a smooth position during the leave-in time, may also be used.

The hair straightening/relaxing composition as disclosed herein may also comprise at least one adjuvant chosen, for example, from silicones in soluble, dispersed and micro-dispersed forms, nonionic, anionic, cationic and amphoterically surfactants, emulsifiers, glycerin, glycerin monochlorohydrin, and polyglycerol esters, vitamins and provitamins including panthenol, waxes other than ceramides, glycolipids and pseudoceramides, water-soluble and liposoluble, silicone-based and non-silicone-based sunscreens, nuclease agents and opacifiers, sequestering agents, plasticizers, solubilizers, acidifying agents, mineral and organic thickeners, antioxidants, hydroxy acids, penetrating agents, fragrances, and preserving agents.

In the event that surfactants are employed in the composition of the present invention, said composition may be used as a shampoo. Similarly, in the event that one or two were to decide to use the composition of the invention as a hair conditioner, various types of conditioning agents can be added to the composition in order to facilitate this hair treating property.

Smoothing of hair treated with the above-disclosed hair straightening/relaxing composition involves using a combination of heat and means for physically smoothing the hair. The heat necessary to effectuate smoothing should be at least 50°C; preferably at least 75°C; preferably at least 100°C. The precise amount of heat employed will depend on the concentration of the non-hydroxide compound present in the composition. This heat may emanate from any suitable source such as, for example, a hair dryer or hot/flat iron.

The means for physically smoothing hair can be any apparatus capable of physically smoothing the hair such as, for example, a hair brush or comb. In one embodiment, the means for smoothing hair also serves as the source for generating heat such as, for example, a hot/flat iron.

According to one embodiment of the present invention, there is provided a process for straightening or relaxing hair involving the steps of: (a) pre-alkalizing the hair by contacting it with an alkaline composition having a pH of from about 8.5 to about 10.5 to form pre-alkalized hair; (b) contacting the pre-alkalized hair with the above-disclosed hair straightening/relaxing composition to form treated hair; (c) optionally, rinsing the hair straightening/relaxing composition from the treated hair, after it has been in contact with the hair for a period of less than 60 minutes, preferably less than 40 minutes, preferably less than 30 minutes, preferably less than 20 minutes; (d) optionally, contacting the treated hair with a non-volatile oil chosen from plant, animal, mineral and synthetic oils; and (d) smoothing the treated hair using a combination of heat and means for physically smoothing hair.

As is disclosed above, the hair straightening/relaxing composition may either be left on the hair, or rinsed out. As for the non-volatile oil, if employed, it will preferably remain on the hair.

According to another embodiment of the present invention, there is provided a process for straightening or relaxing hair involving the steps of: (a) pre-alkalizing the hair by contacting it with an alkaline composition having a pH of from about 8.5 to about 10.5 to form pre-alkalized hair; (b) optionally, contacting the pre-alkalized hair with a non-volatile oil chosen from plant, animal, mineral and synthetic oils; (c) smoothing the hair using a combination of heat and means for physically smoothing hair to form smooth hair; (d) contacting the smoothed hair with the hair straightening/relaxing composition to form treated hair; (e) optionally, rinsing the hair straightening/relaxing composition from the treated hair after it has been in contact with the hair for a period of less than 60 minutes, preferably less than 40 minutes, preferably less than 30 minutes, preferably less than 20 minutes; and (f) optionally, smoothing the treated hair using a combination of heat and means for physically smoothing hair to form smooth hair.

It should be noted that the steps of: contacting the hair with a non-volatile oil; and smoothing the hair, may be performed prior to and/or after application of the hair straightening/relaxing composition.

In commercially available hair straightening or relaxing compositions, a highly caustic hydroxide compound such as sodium hydroxide must be used in order to satisfactorily straighten/relax the hair without heat. In the present invention, however, a less caustic and less concentrated non-hydroxide compound can be used because of the synergy realized by using a combination of heat and an apparatus capable of physically smoothing the hair. Without intending to be bound by theory, it is believed that a synergistic effect in hair straightening/relaxing is realized due to an induced supercontraction and denaturation of hair protein caused by the combination of heat and physical smoothing.

Moreover, due to the use of a less caustic and less concentrated non-hydroxide compound, a barrier substance is not required when using the hair straightening/relaxing composition of the present invention. Commercially available hair relaxing products oftentimes require the hair stylist to apply a barrier substance such as petrolatum to the skin surrounding the scalp and the area around the ears. The barrier substance is used to prevent the skin from becoming irritated if the hair relaxing product contacts the skin. A barrier substance is not necessary when using the process of the present invention because the concentration and the irritation of the non-hydroxide compound is much lower.

The present invention will be better understood from the examples which follow, all of which are intended for
illustrative purposes only, and are not meant to unduly limit the scope of the invention in any way.

EXAMPLES

[0043] The Percentage Straightening Efficiency (% SE) was calculated using the following formula:

\[ \text{SE} = \frac{A - B}{A} \times 100 \]

where \( A \) = final length measured (cm), \( B \) = initial length of hair (10 cm)(full length of hair when straight).

[0044] The following examples show the % SE of hair treated with various protocols.

Example 1

[0045] In this example, kinky hair was pre-treated with either a conventional shampoo (15% SLES, pH 4.34) or an alkaline shampoo (15% SLES, pH 9.65) for 2 minutes, rinsed for 10 seconds, blot-dried, then soaked in 2% MEA solution (10 minutes at room temperature or 10 minutes at 50°C), blot-dried, then straightened with a flat iron at 400°F. (3 passes/6 seconds each). The hair was then shampooed and the % SE determined as described above.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Acid Shampoo, 2% MEA at RT</th>
<th>Acid Shampoo, 2% MEA at 50°C</th>
<th>Alkaline Shampoo, 2% MEA at RT</th>
</tr>
</thead>
<tbody>
<tr>
<td>% SE</td>
<td>46%</td>
<td>70%</td>
<td>83%</td>
</tr>
</tbody>
</table>

[0046] The results showed that pre-alkalizing the hair and treating the hair with MEA at room temperature will improve the % SE to the same extent as treating the hair with MEA at high temperature.

Example 2

[0047] Following the protocol in Example 1, kinky hair was pre-alkalized then treated with various solutions of Pyrrolidine at room temperature. The % SE are shown below.

<table>
<thead>
<tr>
<th>Pyrrolidine</th>
<th>0.1%</th>
<th>0.5%</th>
<th>1%</th>
<th>4.1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>% SE</td>
<td>55%</td>
<td>77%</td>
<td>94%</td>
<td>97.5%</td>
</tr>
</tbody>
</table>

[0048] The results showed that as the concentration of the cyclic amine increased, the % SE increased as well.

What is claimed is:

1. A process for straightening or relaxing hair comprising:
   (a) pre-alkalizing the hair by contacting it with an alkaline composition having a pH of from about 8.0 to about 10.5 to form pre-alkalized hair;
   (b) optionally, rinsing the alkaline composition from the pre-alkalized hair;
   (c) providing a hair straightening/relaxing composition containing:
      (i) from about 0.1 to about 50% by weight of at least one weak non-hydroxide base; and
      (ii) remainder, to 100%, a cosmetically acceptable medium, all weights based on the weight of the hair straightening/relaxing composition;
   (d) contacting the hair with the hair straightening/relaxing composition to form treated hair;
   (e) optionally, rinsing the hair straightening/relaxing composition from the treated hair;
   (f) optionally, contacting the treated hair with a non-volatile oil; and
   (g) smoothing the treated hair using a combination of heat and means for physically smoothing hair.

2. The process of claim 1 wherein (c)(i) is employed in an amount of from about 0.1 to about 50% by weight, based on the weight of the hair straightening/relaxing composition.

3. The process of claim 1 wherein (c)(i) has a pKa of from about 0 to about 15.

4. The process of claim 1 wherein (c)(i) is a nitrogen-containing base.

5. The process of claim 1 wherein (c)(i) is a cyclic amine.

6. The process of claim 1 wherein (c)(i) is chosen from an ethylenediamine, an ethanolamine, an imidazole, a pyrrole, and mixtures thereof.

7. The process of claim 1 wherein (c)(i) is a mixture of ethylenediamine and imidazole.

8. The process of claim 1 wherein (c)(i) is a mixture of monoethanolamine and imidazole.

9. The process of claim 1 wherein (c)(i) is chosen from an alkali metal phosphate, an alkali metal carbonate, and mixtures thereof.

10. The process of claim 1 wherein (d) is performed for less than about 60 minutes.

11. The process of claim 1 wherein (d) is performed for less than about 20 minutes.

12. The process of claim 1 wherein the process is performed without the use of a barrier substance.

13. The process of claim 1 wherein (f) is chosen from plant, mineral, animal and synthetic oils.

14. The process of claim 1 wherein (c)(i) is employed in an amount of from about 0.2 to about 15% by weight, based on the weight of the hair straightening/relaxing composition.

15. The process of claim 1 wherein the heat employed in step (g) is at least about 50°C.

16. The process of claim 1 wherein the heat employed in step (g) is at least about 100°C.

17. The process of claim 1 wherein the means for physically smoothing hair is chosen from a brush and a comb.

18. The process of claim 1 wherein step (g) is performed using a hot/flat iron at a temperature of at least about 100°C.

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