PROCESS FOR SETTING HAIR WITH POLYCONDENSABLE UREA AND THIOUREA COMPOUNDS

Inventors: Gregoire Kalopissis; Henry Philippe De Beaulieu; Jean-Louis Abbeg; Giuliana Gilardi, all of Paris, France

Assignee: Societe Anonyme dite L'Oreal, Paris, France

Filed: Dec. 3, 1969

Appl. No.: 881,903

ABSTRACT

Hair is set by impregnating the same, in the presence of an acidic catalyst, with a polymerizable compound having the formula

wherein X is oxygen or sulfur and R, R', R_1, and R_2 each are hydrogen or lower alkyl, winding the hair on rollers and drying the hair.

4 Claims, No Drawings
PROCESS FOR SETTING HAIR WITH POLYCONDENSABLE UREA AND THIOUREA COMPOUNDS

The present invention has for its object a novel composition and a novel process for setting hair.

It is known that the results obtained when hair is set with standard hair setting lotions often depend on the nature of the hair treated.

In some particular cases, for example, when very fine or soft hair is set, the setting with standard lotions lacks luster and body. The hair in this case has a rather dull appearance and the hold of the coiffure does not resist successive modifications that are imposed on it, either by combing, or by the action of the wind and various atmospheric agents.

The present invention relates to a composition and a process for setting hair, particularly suitable for setting “difficult” hair (i.e., fine or soft hair) making it possible to obtain improved results, both in regard to the holding of the setting and the luster and body of the hair after setting.

The compositions according to the present invention are characterized by the presence of a polycondensable compound that can polymerize in an acid medium, the polymerization being accelerated by adding heat, and giving rise to a resin fixed in a way very close to the keratin of the hair, which increases its body and holding.

The present invention has for its object the novel industrial product which constitutes a cosmetic composition making it possible in particular to set hair, characterized by the fact that it contains, in a standard cosmetic vehicle or base, at least one polycondensable compound corresponding to the following formula:

\[
\begin{align*}
R-N &-Y \quad N-R' \quad \text{[R, X, Y]} \quad \text{[R, X, Y]} \\
\text{[R, X, Y]} &-N \quad R-N \quad \text{[R, X, Y]} \\
\end{align*}
\]

wherein:
- \( R \) represents an oxygen atom or a sulfur atom,
- \( R \) and \( R' \) represent either a hydrogen atom or a lower alkyl radical, and \( R_1 \) and \( R_2 \) represent either a hydrogen atom or a lower alkyl radical.

The composition according to the invention can advantageously be present in the form of an aqueous or hydroalcoholic solution. However, in particular embodiments, it can also be present in the form of a gel, cream, or aerosol.

Of the polycondensable compounds that can be used, according to the invention, we can cite:

- 4,5-dihydroxyethylene urea, of the formula:

\[
\begin{align*}
\text{CH}_2 &-N \quad \text{N-CH}_3 \\
\text{OH} &-\text{CH} \\
\text{OH} &-\text{OH} \\
\end{align*}
\]

- 4,5-dimethoxyethylene thiourea, of the formula:

\[
\begin{align*}
\text{CH}_2 &-N \quad \text{N-CH}_3 \\
\text{OH} &-\text{CH} \\
\text{OH} &-\text{OH} \\
\end{align*}
\]

- 4,5-dihydroxyethylene dimethylurea, of the formula:

\[
\begin{align*}
\text{CH}_2 &-N \quad \text{N-CH}_3 \\
\text{OH} &-\text{CH} \\
\text{OH} &-\text{OH} \\
\end{align*}
\]

In a preferred embodiment, the composition also contains resins which are conventionally used in hair setting lotions such as polyvinyl pyrrolidone/vinyl acetate or vinyl acetate/crotonic acid copolymers. The concentration of these resins in the composition can be between 0.5 and 5 percent by weight.

In a particular embodiment, the cosmetic composition can also contain an acid reacting compound acting as a catalyst, in a sufficient amount to bring the pH of the composition to a value between 1.5 and 5. The acid reacting compounds can be inorganic acids such as sulfuric, hydrochloric, phosphoric acids, acid salts such as sodium and potassium monophosphates or organic acids such as acetic acid, citric acid, lactic acid and formic acid.

The composition according to the invention can, in addition, contain any conventional ingredient that can be used in cosmetics such as a swelling agent, surfactant, dye and perfume.

In a preferred embodiment, the composition according to the invention is made in two parts, one of which contains the polycondensable compound whose formula is indicated above, while the other contains the cosmetic resin and the acid reacting compound. Thus the compositions according to the invention can be made up of a solid part containing only the polycondensable compound, and a liquid part containing an aqueous or hydroalcoholic solution of an acid reacting compound, these two parts being intended to be mixed at the time of use.

However, it is also possible that said setting composition is in the form of a solution of the polycondensable compound not containing the acid reacting compound, the hair being impregnated with said composition being rinsed before or after with an acid solution according to a process that will be described below.

The present invention also has for its object a novel process to set hair characterized by the fact that the hair is impregnated with a composition containing, in a conventional cosmetic vehicle or base, at least one polycondensable compound corresponding to the following formula:

\[
\begin{align*}
\text{CH}_2 &-N \quad \text{N-CH}_3 \\
\text{OH} &-\text{CH} \\
\text{OH} &-\text{OH} \\
\end{align*}
\]

wherein:
- \( X \) represents an oxygen atom or a sulfur atom,
- \( R \) and \( R' \) represent either a hydrogen atom or a lower alkyl radical,
3,661,161

R₁ and R₂ represent either a hydrogen atom or a lower alkyl radical, and the hair is given an acid rinse, either before or after impregnation with the composition mentioned above, the hair being rolled on setting rollers and dried with heat.

According to a variation in the process described above, the hair is impregnated with a composition containing the polycondensable compounds described above, and whose pH has been brought, at the time of use, to a value between 1.5 and 5, by the addition of a sufficient amount of acid, and the hair is rolled on setting rollers and dried by heat.

For a better understanding of the invention, there will now be described, by way of non-limiting illustration, some examples of the compositions and their use.

EXAMPLE 1

At the time of use, the solid part and liquid part of the following composition, made separately, are mixed:

<table>
<thead>
<tr>
<th>Grams</th>
<th>Solid part:</th>
<th>Liquid part:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0,5-dimethoxyethylene urea</td>
<td>4 g.</td>
</tr>
<tr>
<td></td>
<td>polyvinylpyrrolidone/vinyl</td>
<td>2 g.</td>
</tr>
</tbody>
</table>

which is a white powder having a ratio of PVP to VA of 60:40 and having a specific gravity (25°C.) of 1.27 ± 0.01 determined on the molten copolymer. Its K-value ranges between 30 and 50 wherein the K-value is a function of means molecular weight and is derived from the formula: log ρrel/C = (75K/7) + 1.5K + C.

wherein K = 1,000, C = conc. in g/100 ml soln. and ρrel = viscosity of the solution compared to the solvent. Its Gardner-Haaldt viscosity at 25°C. in 25 percent ethanol is 50 centipoises

lactic acid q.s.p. pH2
water q.s.p. 100 cc.

After both parts of this composition have been thoroughly mixed, fine and brittle hair, previously washed and dried, is impregnated at a rate of 20 cm² of mixture per head of hair. The hair is then put up in curlers and dried under a dryer at a temperature of 60°C.

Thus a setting is obtained which presents an excellent body and suitable luster, whereas when setting is performed with a standard setting lotion on the same head of hair, it does not present a satisfactory hold.

EXAMPLE 2

By operating as indicated in Example 1, a setting is performed with a composition made in the following two solids and liquids parts:

<table>
<thead>
<tr>
<th>Grams</th>
<th>Solid part:</th>
<th>Liquid part:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4,5-dihydroxyethylene dimethyleurea</td>
<td>4 g.</td>
</tr>
<tr>
<td></td>
<td>polyvinylpyrrolidone/vinyl</td>
<td>2 g.</td>
</tr>
<tr>
<td></td>
<td>acetate 6 60 copolymer</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>water q.s.p.</td>
<td>100 cc.</td>
</tr>
</tbody>
</table>

EXAMPLE 3

To set soft hair on which standard setting lotions do not give satisfactory results, the following operations are performed:

First, the hair is given a cationic shampooing intended to bring its pH to a value close to 2. Such a shampooing can have the following composition:

<table>
<thead>
<tr>
<th>Grams</th>
<th>CH₂=NH—CH—CO₂Na</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CH—CONH(CH₂)₂—N</td>
</tr>
<tr>
<td></td>
<td>CH₂H</td>
</tr>
</tbody>
</table>

-CH₂O-CH₂(OH)OH xH at 100%... 100

Lactic acid, q.s.p. 3
Water, q.s.p. 1,000

Then the hair is dried and impregnated with a composition containing:

dihydroxyethylene urea
water q.s.p. 4 g.

The hair is then put up in curlers and dried. There is obtained a setting presenting an excellent luster and satisfactory body.

EXAMPLE 4

To achieve a setting of fine and brittle hair, previously washed and dried, there is applied to the head of hair a gel having the following composition:

<table>
<thead>
<tr>
<th>Grams</th>
<th>oleic acid 10 moles O.E.</th>
<th>27 g.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>paraffin oil</td>
<td>23 g.</td>
</tr>
<tr>
<td></td>
<td>4,5-dihydroxyethylene dimethyleurea</td>
<td>0.5 g.</td>
</tr>
<tr>
<td></td>
<td>acetic acid q.s.p. pH 3.5</td>
<td>50 cm.³</td>
</tr>
</tbody>
</table>

The setting is then performed with the usual technique.

What is claimed is:

1. A process for setting hair comprising impregnating said hair with an effective amount of a composition comprising an aqueous solution of a polymerizable compound having the formula:

```
X
O
R₁—N—H—N—R₂
CH—CH
OR O'R
```

wherein X is selected from the group consisting of oxygen and sulfur, R₁, R₂, R₃, and R₄ each independently are selected from the group consisting of hydrogen and lower alkyl, said compound being present in amounts of 0.5 to 10 percent by weight of said composition, rinsing said hair with an aqueous acidic solution prior to or subsequent to impregnating the same with said composition, winding said hair on rollers and drying said hair.

2. The process of claim 1 wherein said compound is selected from the group consisting of 4,5-dihydroxyethylene urea, 4,5-dihydroxyethylene thiourea, 4,5-dihydroxyethylene dimethyleurea, 4,5-dimethoxyethylene urea and 4,5-dimethoxyethylene diethyleurea.

3. The process of claim 1 wherein said acidic aqueous solution consists essentially of an aqueous solution of a member selected from the group consisting of lactic acid, acetic acid, formic acid, citric acid, sulfuric acid, hydrochloric acid, phosphoric acid and sodium and potassium monophosphates, said member being present in amounts effective to polymerize said compound on said hair.

4. A process for setting hair comprising impregnating said hair with an effective amount of a composition comprising an aqueous solution of a polymerizable compound having the formula:

```
X
O
R₁—N—H—N—R₂
CH—CH
OR O'R
```

wherein X is selected from the group consisting of oxygen and sulfur, R₁, R₂, R₃, and R₄ each independently are selected from the group consisting of hydrogen and lower alkyl, present in amounts of 0.5 to 10 percent by weight of said composition and an acidic catalyst selected from the group consisting of lactic acid, acetic acid, formic acid, citric acid, sulfuric acid, hydrochloric acid, phosphoric acid and sodium and potassium monophosphates present in amounts sufficient so
that the pH of said composition is between 1.5 and 5, winding said hair on rollers and drying said hair.