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PROCESS FOR WAVING HUMAN HAIR WITH 2,5-DIMERCAPTOTHIODIAZOLINE

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The present invention relates to a process for the permanent waving of human hair.

Hair waving compositions find extensive use commercially. The choice of hair waving compositions is necessarily limited based on the efficacy of the hair waving composition evaluated against the toxicity, odor and skin irritant qualities thereof. While a great many compositions have varying efficacy in the waving of human hair, the choice of commercial compositions is severely limited because of the frequent high toxicity, objectionable odor, and skin irritant qualities of the hair waving composition. In addition, useful hair waving compositions frequently have other adverse side effects, such as hair damage or hair splitting.

It is essential that any hair waving solution be highly effective in the waving of human hair and also be relatively non-toxic and safe for home consumption, especially in view of the lack of effective control available in the home use of the solution. In addition, it is highly desirable that it be free from objectionable odor.

Accordingly, it is an object of the present invention to provide a novel process for the permanent waving of human hair.

It is a still further object of the present invention to provide a process, as aforesaid, which is highly effective in the waving of human hair and also which utilizes materials which are relatively non-toxic, free from objectionable odor, and relatively negative as a skin irritant.

It is an additional object of the present invention to provide a process as aforesaid, which is safe and effective and commercially competitive.

Further objects and advantages of the present invention will appear hereinafter.

In accordance with the present invention, it has now been found that the foregoing objects and advantages of the present invention may be readily accomplished. The process of the present invention comprises contacting human hair with an aqueous solution containing from 1 to 10 and preferably from 1 to 5 percent by weight of 2,5-dimercaptothiodiazoline. In the preferred embodiment the hair is treated with a solution having a pH of from 8 to 9.5 prior to the waving solution treatment.

The hair waving solution of the present invention comprises an aqueous solution containing from 1 to 10 and preferably from 1 to 5 percent by weight of 2,5-dimercaptothiodiazoline.

The process of the present invention comprises contacting human hair with an aqueous solution as aforesaid. The solution may contain from 1 to 10 and preferably from 1 to 5 percent by weight of 2,5-dimercaptothiodiazoline. In addition, other additives may be employed in the solution to effect particular results provided they do not destroy the basically aqueous nature of the contacting solution, the critical aspect of the present invention being the provision of the requisite quantity of the hair waving component, 2,5-dimercaptothiodiazoline. Exemplificative additional ingredients which may be used to modify the aqueous solution include, but are not limited, to the following: alcohols; opacifiers; conditioners; perfumes, and dyes.

It is noted that the present invention preferably utilizes 2,5-dimercaptothiodiazoline as the sole active ingredient; but the present invention encompasses within its scope utilizing other conventional active ingredients in combination with 2,5-dimercaptothiodiazoline.

The human hair may be immersed or contacted with or sprayed with the hair waving solution for any desired period of time. Naturally, it is desirable to effect the desired hair waving in as short a period as possible. It is a particular advantage of the present invention that significant hair waving results are obtained with relatively short contact times, i.e., the process of the present invention efficiently obtains a high degree of curl in as little as one minute contact time and preferably in less than thirty minutes. Extended contact times may be utilized, if desired, but no particular advantage is thereby effected.

In the preferred embodiment, the hair is treated with an aqueous solution having a pH of from 8 to 9.5 prior to the waving solution treatment because hair is most susceptible to treatment under mildly basic conditions. Any suitable solution having the requisite pH and compatible with the present treatment may be conveniently employed, preferably mild bases, such as ethanol amine, propanol amine and sodium ammonium, i.e., a solution of sodium hydroxide and ammonium hydroxide, e.g., 10 parts ammonium hydroxide and 1 part sodium hydroxide.

After the hair waving treatment, the hair may be efffectively rinsed under cold water and neutralized in the commercial manner and re-washed. The initial rinsing under cold water is effective in removing remnants of the hair waving solution. The commercial neutralizer and re-wash are standard operations and serve to neutralize and remove excess waving solution and permanently set the hair. Representative neutralizers include aqueous solutions containing from 1 to 10 percent by weight of alkali metal bromates or perborates, optimally containing phosphates as stabilizers.

It is a significant aspect of the present invention that the treatments thereof may be effected and a high degree of curl obtained with relative safety to the user with respect to skin-irritant qualities and toxicity; for example, German Patent 959,402 uses the di-sodium salt in skin protective agents against light. This is highly significant in view of the critical requirement for these properties in any commercial application of the hair waving solution. In addition, and especially important in commercial use, the hair waving solution of the present invention is free from objectionable odors.

The present invention will be more readily apparent from a consideration of the following illustrative examples:

EXAMPLE 1

The test procedures utilized were to prepare the hair waving solution and immerse the test hairs in the waving solution for 15 minutes. The test hairs were ten human hairs cemented together at the root and then wrapped around a 5/16" diameter glass rod. The ends of the bundle were taped to the rod. After the hairs were immersed in the waving solution, they were removed and rinsed under cold tap water. They were then neutralized in a 5 percent sodium bromate solution for 10 minutes, washed again in cold tap water and removed from the rod to a piece of filter paper.

The diameter of the curl was then measured.

The hair was then re-wet with water and the diameter of the curl measured again.

The tightness of the initial curl and resistance to uncurling after wetting are measures of the efficacy of the treatment.

EXAMPLE 2

The following table shows the results of the tests in Example 1, utilizing a variety of test treatments. The following table shows the results obtained with a waving

treatment consisting of water, consisting of the waving solutions of the present invention, and consisting of various comparative waving solution treatments. It is to be particularly noted that other sulfur-hydrazine containing solutions show little or no hair waving ability. This is especially surprising, since it would normally be expected that such related materials would also be efficacious in this respect.

The compound of the present invention did not have an objectionable odor and no hair splitting was observed.

Table 1

Waving Treatment	pH of Waving Solution	Curl Diameter	
		Initial (in.)	After Rewetting (in.)
Water	7	1 3/16	
2,5-Dimercaptothiodiazoline	1	1 1/16	1 1/16
2,5-Dimercaptothiodiazoline, add NH_4OH	8.5	1	1
Methyl dithiocarbazinate	5	1 9/16	1 9/16
Methyl dithiocarbazinate, add NH_4OH	8.5	1 1/16	1 1/16
3,5-Dithiol-4-amino-1,2,5-triazole, solubilized with NH_4OH	9.2	1 3/16	1 9/16
3-Thiol-5-amino-1,2,4-triazole add NH_4OH	8.7	1 5/16	1 1/16
2-Amino-5-thiol-1,3,4-thiadiazole, add NH_4OH	8.9	1 3/16	1
2,5-Dimercaptothiodiazoline, hair soaked in a solution of pH 8.5 before waving solution treatment [1]	1	7/16	8/16

[1] The basic solution was an aqueous solution containing per 100 cc. 12 cc. of 0.1 N NaOH and 50 cc. of 0.1 M H_3BO_3 (said 0.1 M H_3BO_3 prepared in 0.1 M KCl).

This invention may be embodied in other forms or carried out in other ways without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered as in all respects illustrative and not restrictive, the scope of the invention being indicated by the appended claims, and all changes which

come within the meaning and range of equivalency are intended to be embraced therein.

What is claimed is:

1. A process for waving human hair which comprises: contacting human hair with an aqueous solution containing from 1 to 10 percent by weight of 2,5-dimercaptothiodiazoline.

2. A process for waving human hair which comprises: contacting said hair with a solution having a pH of from 8 to 9.5 and subsequently contacting said hair with an aqueous solution containing from 1 to 10 percent by weight of 2,5-dimercaptothiodiazoline.

3. A process according to claim 2 wherein said solution having a pH of from 8 to 9.5 is selected from the group consisting of ethanol amine, propanol amine, and sodium ammonium.

4. A process according to claim 1 wherein said solution contains from 1 to 5 percent by weight of 2,5-dimercaptothiodiazoline.

5. A process according to claim 1 wherein said hair is contacted with said solution for from 1 to 30 minutes.

6. A process for waving human hair which comprises: contacting said hair with an aqueous solution having a pH of from 8 to 9.5, subsequently contacting said hair with an aqueous solution containing from 1 to 10 percent by weight of 2,5-dimercaptothiodiazoline, rinsing the hair in water, neutralizing the hair in an aqueous solution containing from 1 to 10 percent by weight of a material selected from the group consisting of an alkali metal bromate and an alkali metal perborate, and rewashing the hair in water.

References Cited by the Examiner

FOREIGN PATENTS

959,402 3/57 Germany.

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