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3,063,908 PROCESS FOR PERMANENT DEFORMATION OF HAIR

Gregoire Kalopissis, Paris, France, assignor to
L'Oreal, Paris, France

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4 Claims. (Cl. 167—87.1)

It is well known that substituted or unsubstituted amides derived from mercaptoalkanoic acids can be employed to effect permanent deformation of the hair at room temperature.

These amides can be used in aqueous solution at pH values ranging, for example, from 5 to 9.5. However, while in this pH range and with a number of these amides, a permanent wave may be obtained which is satisfactory from a theoretical standpoint serious drawbacks are encountered, as a result of which the mercaptoamides cannot readily be commercialized in the form of hair waving compositions.

When the aforementioned amides are employed in alkaline media for hair waving, e.g. from pH 8 to 9.5, the prepared solutions, which are of the order of 0.5 to 1.5 molar, appear to be substantially stable and do not liberate any hydrogen sulphide. On the other hand, within such a pH range, it is usually impossible for the operator to perform more than three permanent waving operations with bare hands without suffering serious injury to the hands. As a rule, these alkaline amide solutions also produce itching and irritation of the scalp of the treated persons, and lesions may be produced which in some cases may be fairly serious.

When the same amides are employed in the same concentration in solutions of lower pH values ranging, for example, from 5 to 7.5, the resulting solutions are unstable and very rapidly liberate considerable quantities of hydrogen sulphide, which render them unusable. Moreover, by reason of the nauseous odour and the toxicity of hydrogen sulphide, in most countries the use of hair waving compositions containing this compound is prohibited, or the concentration in which it may be present in them is limited by law. However, in this lower pH range, the injurious action of the aforesaid solutions on the hands of the operator is greatly reduced and they do not produce any itching or irritation of the scalp of treated persons.

The object of the present invention is to provide a process utilizing mercaptoalkanoic amides for obtaining plasticization of the keratin of live hair or of similar fibers, which does not possess the aforesaid disadvantages.

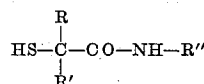
According to the present invention there is provided a process for the permanent deformation of live human hair or other keratinous fibers which comprises impregnating the hair or fibers with a freshly prepared aqueous solution, obtained by adding to an aqueous alkaline stock-solution of a primary or secondary mercaptoalkanoic acid amide an acid or acidic buffer composition, in a quantity sufficient to ensure a pH value of 5 to 7.5 in the resulting solution, constraining the hair or fibers in a desired configuration, and thereafter fixing them in a known manner while in said configuration. Preferably the aqueous alkaline stock-solution has a pH above 8 and the hair impregnating solution has a pH of about 7. The acid or acidic buffer composition may be in the form of an aqueous solution or a powder which will dissolve in the amide solution.

Another object of the present invention is a hair-waving kit for use in accordance with the above-mentioned process, comprising two separate compositions to be

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mixed at the time of use, one of which is an aqueous alkaline stock-solution of a primary or secondary mercaptoalkanoic acid amide and the other one is a quantity of an acid or acidic buffer composition which is sufficient to impart the resulting mixture a pH value of 5 to 7.5.

The amides which may be used according to the invention conform to the general formula:



wherein R is a hydrogen atom or an alkyl group containing not more than 4 carbon atoms, R' is a hydrogen atom or an alkyl group containing not more than 4 carbon atoms and R'' is a hydrogen atom or an alkyl or hydroxyalkyl group containing not more than 4 carbon atoms.

The concentration of amide in the amide solution should be in general from 0.5 to 1.5 molar and the desired alkalinity of the solution may be obtained by using weak bases, such as ammonia or organic bases (e.g. mono-, di- or triethanolamine).

The acid or acidic buffer composition may contain weak acids such as acetic acid or lactic acid, or salts possessing marked buffering properties and giving acid solutions on hydrolysis such as di-hydrogen phosphates, acid citrates and acid phthalates, of potassium, sodium and ammonium. The quantity of acidic compound to be used in the composition is calculated as a function of the pH and of the quantity of base introduced into the first solution, so that, when the two components have been mixed, the pH of the final solution is 5 to 7.5 preferably 7.

The two compositions are mixed immediately prior to application of the mixture to the hair. The final mixture provides a permanent waving liquid which will act in acidic or neutral medium and which is not harmful to the keratin of the hair and at the same time contains only very small quantities of hydrogen sulphide.

It is of course within the ambit of the present invention to incorporate into the final solution additional agents intended for the treatment and grooming of the hair, which agents may be added to one or both of the components of the final solution before mixing them.

The following examples will serve to illustrate the invention. All percentages are by weight.

Example I

100 cc. of a 9.9% aqueous solution of mercaptoacetamide ($\text{SH}-\text{CH}_2-\text{CO}-\text{NH}_2$) adjusted to a pH of 8.5 with ammonia (about 11 g./l. of NH_3) were neutralized at the time of use with 10 cc. of a citric acid solution (390 g./l.). The resultant mixture had a pH of 6.8 to 6.9.

Human hair was impregnated with this solution, wound on curlers and left in contact with the solution for 15 to 25 minutes at room temperature, or from 8 to 12 minutes with heating at about 80° C. by means of any suitable device. The hair was then rinsed and treated with an oxidizing solution.

The wave obtained was of attractive appearance and completely resistant to washing and moisture. The hands of the operator and the scalp of the treated person remained unaffected.

Example II

An 8% aqueous solution of mercaptoacetamide was brought to pH 9.0 with ammonia. 100 cc. of this solu-

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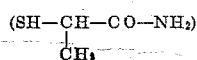
tion were neutralized at the time of use with 8 g. of ammonium di-hydrogen orthophosphate. The resultant solution had a pH of 6.6 to 6.7 and it was applied as described in Example I and with similar results.

Example III

100 cc. of a 5.5% aqueous solution of N-methyl mercaptoacetamide ($\text{SH}-\text{CH}_2-\text{CO}-\text{NH}-\text{CH}_3$) containing 3% of ammonium di-hydrogen orthophosphate were brought to pH 8.4 with ammonia. At the time of use, 100 cc. of a lactic acid solution (520 g./l.) were added thereto, giving the resultant solution a pH of 6.2. This solution was used as described in Example I and gave similar results.

Example IV

An 11.5% aqueous solution of α -mercaptopropionamide



was brought to pH 8.6 with ammonia. At the time of use, 100 cc. of this solution were neutralized with 10 cc. of a solution containing 300 g./l. of citric acid and 550 g./l. of sodium di-hydrogen orthophosphate. The pH of the resultant solution was 6.8 and it was used under the same conditions and gave similar results as described in Example I.

Example V

100 cc. of a 9.9% aqueous solution of mercaptoacetamide containing sufficient ammonia to have a pH of 8.5 (about 11 g./l. of NH_3) were neutralized at the time of use by the addition of about 3.9 g. of citric acid in powder form. The mixture was stirred to effect complete dissolution of citric acid. The resultant solution had a pH of 6.8 to 6.9. This solution was applied as described in Example I and gave similar results.

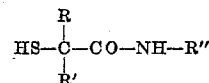
What I claim is:

1. A process for the permanent deformation of live human hair, which comprises:

(a) preparing a stock solution having a pH of between 8 and 9.5, for storage purposes, of an aqueous solu-

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tion of an amide of mercapto alkanolic acid of the general formula



in which R is selected from the group consisting of hydrogen atoms and those alkyl groups having at most 3 carbon atoms, R' is selected from the group consisting of a hydrogen atom and those alkyl groups having at most 3 carbon atoms, and R'' is selected from the group consisting of a hydrogen atom, alkyl and hydroxyl alkyl groups having at most 3 carbon atoms,

(b) the step of adding a substance having an acid reaction selected from the group consisting of organic acid, their acid salts and acid salts of inorganic acids in a quantity sufficient to bring the pH of the mixture to a value of between 5 and 7.5 at the time of application to the hair,

(c) constraining the hair in a desired configuration,

(d) applying said solution having a pH of between 5 and 7.5 to the hair,

(e) fixing the hair in said configuration by means of oxidation.

2. A process as claimed in claim 1, in which the amide of the mercapto alkanolic acid is mercaptoacetamide.

3. A process as claimed in claim 1, in which the amide is N-methyl-mercaptoacetamide.

4. A process as claimed in claim 1, in which the amide of the mercapto alkanolic acid is alpha-mercaptopropionamide.

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