

- [54] **HAIR SHADE ADJUSTER**
- [75] Inventors: **Andrew J. Cunningham**, Highland Lakes; **Fred M. Tuffile**, Lakeville, both of Mass.
- [73] Assignee: **Avon Products, Inc.**, N.Y.
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- [58] **Field of Search** **424/62; 8/10.1; 132/7**

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Primary Examiner—Albert T. Meyers
Assistant Examiner—Norman A. Drezin
Attorney, Agent, or Firm—Pennie & Edmonds

[57] **ABSTRACT**

A method and composition of adjusting the color in keratinous fibers, such as wool, hair, fur and the like, comprising subjecting the fibers to a composition containing a combination of dye reducing agents and keratin reducing agents to produce the desired color shade. A high degree of color stability is achieved without the use of a peroxide or ammonia compound when a keratin disulfide reducing agent and an oxidative dye reducing agent are used in combination on dyed keratinous material.

10 Claims, No Drawings

HAIR SHADE ADJUSTER

BACKGROUND OF THE INVENTION

The action of various compounds in the removal of dyes and other pigments from the hair are well known to those skilled in the art. The increasing demand in the market place of materials which color or dye the hair has resulted, similarly, in an increase in demand for dye removers which are safe, noninjurious to the hair and the person and, at the same time, gives a uniform and substantially complete removal of the dye from hair.

In the past, a widely used practice in stripping the color from keratin fibers was to subject the fibers to strong acidic media, to peroxide compounds or to strong alkaline compounds such as ammonia compounds. These treatments adversely affected the mechanical as well as the chemical properties of the fibers due to the length of the treatment and the extent to which the materials had to be used.

When the conditions were controlled to less extreme limits, the results were less desirable from the standpoint of less uniformity or a lessening of the removal of the dye from the keratin fibers.

In the past it was also found that when the keratin fibers were treated so as to remove the dye placed therein, the keratin fiber was subject to air oxidation and resulted in darkening of the hair after use.

SUMMARY OF THE INVENTION

It has now been discovered that a method for removing the color from keratin fibers can be accomplished without the adverse affects noted above. This method utilizes a combination of a dye reducing agent and keratin reducing agent. The reducing formulations cause very extensive color stripping but do not leave the keratin fibers in such a condition as to allow them to darken by air oxidation.

DETAILED DESCRIPTION OF THE INVENTION

Keratin fibers, as is well known to those skilled in the art, contain polypeptide chains which are held in an alpha-helix formation by various types of bonds including covalent disulfide linkages. By the process of the present invention, it is possible to strip color from keratinous materials without substantially impairing the mechanical properties of these materials and with improvement in the resistance to attack by oxidation, such as from air. These problems are often found when applying color removers now available. In accordance with the concept of this invention, the keratinous material, such as hair, is subjected to the action of a disulfide reducing agent in combination with a dye reducing agent. It has been unexpectedly found that a successful hair shade adjusting composition must simultaneously cleave the oxidative dye intermediates and modify the keratin hair in such a way as to permit the removal or deactivation of the dye residues. To accomplish these two independent operations, the keratin fiber is subjected to the combination of two types of reducing agents to achieve the desired results.

Keratin fibers contain polypeptide chains which are in an alpha-helix formation. In order to more uniformly remove the dye from the fibers, it has been found that this helix formation be broken to allow the dye residues which are trapped in the cortex of the helix formation to escape. The helix formation can be broken by cleaving the structural bonds. The strongest of these bonds

is the covalent disulfide linkage which in the cystine-cysteine conversion is broken into thiol residues. The dyed fibers are, therefore, subjected to the action of a keratin reducing agent to allow the cleavage of the disulfide linkage and thus substantially disengage the helix formation of the polypeptide chains. This, in turn, causes swelling of the fibrous material and allows for a more intimate and thorough contact of the dye reducing agent with the material.

The remaining relatively weak bonds which hold the polypeptide chain in an alpha-helix formation may, at the same time, be dissociated to further increase the swelling of the fibrous material. These weak bonds include hydrogen bonds which may be dissociated by amine compounds such as urea and the like. Similarly, ionic bonds within the helix structure may be dissociated by simple pH control.

It has been unexpectedly found that color stripping of keratinous fibers may be readily accomplished by using a combination of a keratin disulfide reducing agent and a dye reducing agent. Various keratin reducing agents which are well known to those skilled in the art may be used. These include thioglycollic acid and the salts of thioglycollic acid including the sodium, calcium, potassium, ammonium and the like; threitols such as dithiothreitol and the like; bisulfate salts such as potassium bisulfate, sodium bisulfate and their equivalences; bisulfite salts such as sodium bisulfite, potassium bisulfite, ammonium bisulfite and their equivalence; the various sulfide salts such as the barium, strontium, potassium and the like; and amine compounds such as urea, thiourea, guanidine, alkyl guanidines and guanidine salts.

It has also been found that various phosphorous containing compounds are also excellent keratin reducing agents which are readily be used in combination with dye reducing agents. These include tetrakis(hydroxyalkyl)phosphonium halide wherein the alkyl group contains from 1 to 3 carbon atoms and the halide is preferably chloride; tris(hydroxyalkyl)phosphines wherein the alkyl group contains from 1 to 3 carbon atoms; and tris(hydroxyalkyl)phosphine oxide wherein the alkyl group contains from 1 to 3 carbon atoms.

The above keratin reducing agents are used in conjunction with a dye reducing agent. The dye reducing agents found most useful within the scope of this invention include the metal sulfoxylate formaldehyde compounds including the sodium, potassium, calcium, zinc salts and the like: various hydrosulfite salts such as the sodium, potassium, calcium, zinc and their equivalence are also useful dye reducing agents. Other keratin reducing agents which may be used are mercaptans such as thioglycollic acid and alkali metal thiosulfate salts.

The various keratin reducing agents may be used singly or in combination with each other. These reducing agents are, in turn, used in combination with the various dye reducing agents which may also be used singly or in combination.

In addition, various fillers, buffers, solvents, detergents perfumes, stabilizers and the like may be used in combination with the keratin reducing and dye reducing agents. The use of these various additional ingredients will depend upon the specific mode of application, the specific type of keratin fiber, etc., as is well known to those skilled in the art.

The time of application of the color stripping composition of this invention will depend upon the intensity

of the treatment desired. Generally, the application time may vary from about 15 minutes to about 60 minutes. In some cases a longer or shorter time period may be required. No difficulty is experienced in controlling the treatment. The action of the color stripping composition can be readily followed and the action stopped by removal, such as by rinsing with warm water, when the hair has been lightened to the extent desired.

It has been found that the compositions of this invention may, in general, be applied in an aqueous solution, such as in combination with an aqueous shampoo composition. The aqueous solution being readily applicable to the keratin fibers and may remain on the fibers from about 15 to about 60 minutes. In most instances it has been found that from about 20 minutes to about 40 minutes is sufficient to remove the color. The keratin fiber is then rinsed free of the color-stripping composition with warm water. The fiber may then be washed with any commercial shampoo to remove residual material.

The color stripping composition may comprise of from about 1 part to about 25 parts of keratin reducing agent and from about 1 part to about 15 parts of dye reducing agent. The composition may, as stated above, contain small amounts, totaling up to about 50 parts, of fillers, thickeners, perfumes, organic solvents, buffers, detergents and the like. The remainder of a 100 parts composition to be solvent.

The solvent containing the active ingredients may be water. In addition, small quantities, such as up to 25 percent of the solvent may be an alcohol such as methanol, ethanol, propanol and the like.

It has been found that certain ingredients react with each other upon standing in intimate contact. When employing such substances they should not be permitted to be in contact with each other for any period of time which would result in a reaction impairing or destroying the effectiveness of the color stripping composition of this invention. Substances which will react with one another are advantageously kept in separate containers or one divided packet and mixed just prior to use. Some of the sulfoxylate-formaldehyde compounds have been found to be advantageously packaged in dry form in a separate container as they decompose under the combination of high temperatures and high humidity. Alternatively, a stabilizing compound such as calcium sulfate or aluminasulfate may be incorporated in the color stripping composition.

The following examples are set forth for the purposes of illustration only and are not to be construed as limitations on the present invention except as set forth in the appended claims. All parts and percentages are by weight unless otherwise indicated.

EXAMPLE I

A color stripping composition containing 5 parts thioglycollic acid, 5 parts tetrakis(hydroxymethyl)phosphonium chloride, 5 parts urea and 5 parts sodium sulfoxylate-formaldehyde is mixed with an aqueous shampoo composition of:

formalin	0.025 part
Hydroxyethyl cellulose (M-W=52,000)	0.75 part
n-propanol	15.00 parts
BTC 50 (benzalkonium chloride)	3.00 parts
LMDA (70:30 Lauroyl-myristoyl diethanolamide)	2.00 parts
Cocoyl betaine	3.00 parts

-Continued

Citric acid (25% sol.)	2.00 parts
Butylated hydroxy anisole	1.00 parts
Resorcinol	1.00 parts
Perfume	0.50 part

To the total composition is added 51.275 parts water.

The aqueous solution is applied to human hair and allowed to remain thereon for 25 minutes after which time it is rinsed off with warm water. The resulting hair is several shades lighter. No reoxidative darkening is subsequently observed.

EXAMPLE II

A color stripping composition containing 1 part tris(hydroxymethyl)phosphine, 1 part tris(hydroxymethyl) phosphine oxide, 5 parts urea, and 5 parts sodium sulfoxylate formaldehyde is added to a shampoo solution similar to that described in Example I. 59.725 parts of water is added.

The color stripping shampoo base composition is applied to human hair and allowed to remain thereon for about 30 minutes. The hair is then rinsed of shampoo. The color of the hair is several shades lighter and no air oxidative darkening is observed.

EXAMPLE III

A color stripping composition containing 5 parts tetrakis(hydroxymethyl)phosphonium chloride, 5 parts urea and 5 parts zinc sulfoxylate formaldehyde is added to a shampoo solution similar to that described in Example I. 56.725 parts of water is added.

The color stripping shampoo base composition is applied to human hair and allowed to remain thereon for about 30 minutes. The hair is then rinsed of shampoo. The color of the hair is several shades lighter and no air oxidative darkening is observed.

EXAMPLE IV

A color stripping composition containing 10 parts thioglycollic acid, 5 parts urea and 5 parts sodium sulfoxylate-formaldehyde is added to a shampoo solution similar to that described in Example I to which approximately 60 parts of H₂O is added.

The color stripping shampoo base composition is applied to human hair and allowed to remain thereon for about 30 minutes. The hair is then rinsed of shampoo. The color of the hair is several shades lighter and no air oxidative darkening is observed.

EXAMPLE V

A color stripping composition containing 5 parts THPC, 5 parts potassium bisulfate, 5 parts urea and 5 parts sodium sulfoxylate-formaldehyde is added to a shampoo solution similar to that described in Example I to which approximately 60 parts of H₂O is added.

The color stripping shampoo base composition is applied to human hair and allowed to remain thereon for about 30 minutes. The hair is then rinsed of shampoo. The color of the hair is several shades lighter and no air oxidative darkening is observed.

EXAMPLE VI

A color stripping composition containing 5 parts thioglycollic acid, 5 parts potassium bisulfate, 3 parts dithiothreitol, 5 parts urea and 5 parts sodium hydrosulfite is mixed with a shampoo solution similar to that de-

scribed in Example I to which approximately 49 parts of water is added.

The color stripping shampoo base composition is applied to human hair and allowed to remain thereon for about 30 minutes. The hair is then rinsed of shampoo. The color of the hair is several shades lighter and no air oxidative darkening is observed.

EXAMPLE VII

A color stripping composition containing 5 parts THPC, 5 parts ammonium bisulfite, 5 parts urea and 5 parts sodium sulfoxylate-formaldehyde is mixed with a shampoo base similar to that disclosed in Example I to which is added approximately 52 parts water.

The color stripping shampoo base composition is applied to human hair and allowed to remain thereon for about 30 minutes. The hair is then rinsed of shampoo. The color of the hair is several shades lighter and no air oxidative darkening is observed.

EXAMPLE VIII

A color stripping composition containing 1 part thioglycollic acid, 1 part THPC, 1 part potassium bisulfate, 1 part ammonium bisulfite, 5 parts urea and 1 part sodium sulfoxylate-formaldehyde is mixed with a shampoo base similar to that described in Example I. Approximately 62 parts of H₂O is added thereto.

The color stripping shampoo base composition is applied to human hair and allowed to remain thereon for about 30 minutes. The hair is then rinsed of shampoo. The color of the hair is several shades lighter and no air oxidative darkening is observed.

It will be understood that it is intended to cover all changes and modifications of the disclosure of the invention herein chosen for the purpose of illustration which do not constitute departures from the spirit and scope of the invention.

We claim:

1. A method of removing the color of dyed keratin fibers which comprises:

applying to the fibers an effective amount of an aqueous composition comprising a combination of from about 1 to 15 parts of an oxidative dye reducing agent of zinc sulfoxylate formaldehyde, potassium sulfoxylate formaldehyde, sodium sulfoxylate formaldehyde, calcium sulfoxylate formaldehyde, zinc hydrosulfite, potassium hydrosulfite, sodium hydrosulfite or calcium hydrosulfite and from about 1 part to 25 parts of disulfide reducing agent capable of cleaving covalent disulfide linkages of thioglycolic acid, dithiotreitol, potassium bisulfate, sodium bisulfate, potassium bisulfite, sodium bisulfite, potassium bisulfite, thiourea, tetrakis(hydroxy-

alkyl phosphonium chloride, tris(hydroxyalkyl)-phosphine or tris(hydroxyalkyl)phosphine oxide wherein the above alkyl groups are C₁-C₃ hydrocarbons,

5 treating the fibers with the reducing agents until the desired color shade is produced, and removing the reducing agents from the fibers.

2. The method according to claim 1 wherein the disulfide reducing agent is tetrakis(hydroxymethyl) phosphonium chloride and is used with a dye reducing agent of sulfoxylate-formaldehyde metal salt, said metal being zinc, sodium, calcium or potassium.

3. The method according to claim 1 wherein the disulfide reducing agent is thioglycollic acid and the dye reducing agent is a sulfoxylate-formaldehyde metal salt, said metal being zinc, sodium, calcium, or potassium.

4. The method according to claim 1 wherein the combined reducing agents are applied to the fibers in an aqueous shampoo solution.

5. The method according to claim 1 wherein the combined reducing agents are applied to and treat the fibers for a period ranging from 15 minutes to 60 minutes.

6. An aqueous composition for removing the color of dyed keratin fibers comprising from about 1 to about 25 parts of disulfide reducing agent selected from the group consisting of thioglycollic acid, dithiothreitol, potassium bisulfate, sodium bisulfate, potassium bisulfite, sodium bisulfite, potassium sulfide, thiourea, tetrakis(hydroxyalkyl)phosphonium chloride, tris(hydroxyalkyl) phosphine and tris(hydroxyalkyl)phosphine oxide wherein the above alkyl groups are C₁-C₃ hydrocarbons in combination with from about 1 to about 15 parts of an oxidative dye reducing agent selected from the group consisting of zinc sulfoxylate formaldehyde, potassium sulfoxylate formaldehyde, sodium sulfoxylate formaldehyde, calcium sulfoxylate formaldehyde, zinc hydrosulfite, potassium hydrosulfite, sodium hydrosulfite and calcium hydrosulfite.

7. A composition according to claim 6 wherein the disulfide reducing agent is a tetrakis(hydroxyalkyl)-phosphonium chloride wherein the alkyl group is methyl, ethyl or propyl and the dye reducing agent is potassium sulfoxylate-formaldehyde.

8. A composition according to claim 6 wherein the dye reducing agent is zinc sulfoxylate-formaldehyde.

9. A composition according to claim 6 wherein the dye reducing agent is zinc hydrosulfite.

10. A composition according to claim 6 wherein the disulfide reducing agent is thioglycollic acid.

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