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(71) Applicant: R.M. WALKER HEALTHCARE PRODUCTS, INC. [US/US]; 125 Royal Woods Court, Suite 165, Tucker, GA 30084 (US).

(72) Inventors: ANSCHEL, Nicola, R. ; 4846 Terrace Green Trace, Stone Mountain, GA 30084 (US). WALKER, Ronald, M. ; 3462 Hunters Pace Drive, Lithonia, GA 30038 (US). GAUDREAULT, Rosemary ; 401 North Western Avenue, Parkridge, IL 60068 (US). NEACE-GUTKNECHT, Laura ; 2418 West 34th Place, Chicago, IL 60608 (US).

(74) Agent: COLTON, Laurence, P.; Hurt, Richardson, Garner, Todd & Cadenhead, Suite 1400, 999 Peachtree Street, N.E., Atlanta, GA 30309-3999 (US).

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(54) Title: NEUTRALIZING RINSE AND IMPROVED METHOD FOR CHEMICALLY RELAXING HAIR

(57) Abstract

A neutralizing rinse to minimize damage to hair and scalp, particularly that which occurs during the rinsing step, based on a mixture of an acid, hydroxyethylcellulose, a wetting agent, an opacifier, a color indicator, laureth 23 and a conditioner; a method for applying the neutralizing rinse based on the steps of preconditioning or pretreating the hair, applying a hair relaxer, rinsing the relaxer, applying the neutralizing rinse, combing or shaping the hair and then rinsing the neutralizing rinse from the hair; and a method for preparing the neutralizing rinse based on the steps of first mixing hydroxyethylcellulose with water, then adding acid, then adding laureth 23, then adding an opacifier, and then adding a conditioner. The method for quickly closing down the swollen hair shaft also provides for the hair bonding in a desired configuration and eliminates the less than straight or appearance of under processing, also called reversion.

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NEUTRALIZING RINSE AND IMPROVED METHOD FOR CHEMICALLY RELAXING HAIR

BACKGROUND OF THE INVENTION

1. Field of the Invention.

This invention and process are applicable generally to the cosmetic treatments of hair, and particularly to the area of swollen hair and damage associated with cosmetic treatments that effect permanent or semi-permanent change in hair structure or color, such as, for example, hair relaxing, hair straightening, hair curling, hair bleaching, hair coloring and other permanent chemical processes. Hair damage and undesirable appearance in the form of swollen hair fibers may result from the problems associated with these chemicals effects and subsequent rinsing, and the present invention helps reduce or eliminate such damage and undesirable appearance.

2. Prior Art.

Typically, chemical processes designed to alter permanently the structure or color of hair often result in hair fiber damage, and/or loss in hair manageability, luster, and/or strength. Several prior art inventions incorporate conditioning agents to address the damaging effects before, during and after the chemical process, and several others incorporate conditioners that are stable in the process chemicals and do not seriously interfere with the objective of the chemical process.

United States Patent No. 3,981,312 discloses the use of a prebonder using a polyvalent metal salt and a water soluble reactive polyamide-epichlorohydrin resin. The hair is first reduced, then rinsed and treated with the '312 invention prior to oxidation. The results shown in the '312 example show that the hair had an improved

elasticity and elongation; however, the mechanism was not elucidated. Additionally, the rinsing effects were not disclosed, nor the length of time required to rinse the reducing agent from the hair. There may be significant differences in the effectiveness of this prebonding method if rinsing times differ from application to application. The ideal pH range for the formation is mentioned, but not described as being significant in connection with the conditioning of the hair. Further, the invention must be accompanied by the resin to be effective.

United States Patent No. 4,770,873 discloses an amino-functional silicone conditioner employed within a neutralizer containing an oxidizing agent. The composition is suitable for use after the hair has been treated with a product that reduces the disulfide bond in the hair. Primarily, the '873 invention conditions and oxidizes the disulfide bonds in the hair. The bonds may be cleaved by the typical mercaptans as thioglycolic acid, and by alkali relaxers. The pH considered critical to this composition for optimum results is in the range of 2 to 5, and preferably 2.5 to 4.5. Optional to this invention is the use of a buffered composition. For instance, citric acid/citrate can be used as a buffer with phosphoric acid. The actual pH of the 1873 composition must be at a level so as to not disrupt or break the silicone emulsion. The acidic function is to prevent the degradation of the oxidizer, hydrogen peroxide. The primary thrust of the invention is to reduce damage effects. The examples show the results of the product in terms of combability and water absorption; the better combability most likely being the result of a surface phenomenon as well as the decrease in drying time. The amino-functional silicone is highly attracted to the cuticle. A disadvantage inherent in the 1873 invention is that the problem of hair fiber damage at microscopic

levels may still exist. Additionally, no mention is made of the prevention or lessening of damage during the rinsing processes after treatment with a reducing agent or alkali relaxers.

United States Patent No. 4,795,629 discloses a crosslinking agent in a buffered solution with a pH of 7.4, an optimum condition for the crosslinker to work. Cystamine provides the same degree of strong curl pattern as a conventional neutralizer such as hydrogen peroxide. No disclosure is made as to possible advantages it may have in improving the hair condition, or preventing damage to the hair that could be caused during rinsing.

United States Patent No. 4,602,648 discloses a preshampoo normalizer. This composition is used after an alkaline relaxer or hair straightener is applied to the hair to achieve a level of straightness, and rinsed to remove a substantial portion of the relaxer from the hair prior to shampooing. The composition is massaged into the hair and allowed to remain on the hair an indefinite period of time, left to the judgement of the beautician who has evaluated the porosity, elasticity, texture and density of hair. The disadvantages of this method include the lack of specific times for rinsing after relaxing. Additionally, it is not disclosed as to how the hair swelling influences the intrinsic hair fiber and cuticle interactions. The swollen state of the hair is addressed as a facilitation of the uptake of the protein. This implies an after-the-fact conditioning technique. The 1648 patent teaches the necessity for using a shampoo to remove excess material from the hair and does not address the implications in depth as to the damage seemingly resulting from the shampooing. Therefore the hair is unable to take the preshampoo normalizer to the extent of preventing additional damage that is caused by the shampoo or shampooing process. Further, another disadvantage is

that the hair is manipulated during the application of the pre-shampoo normalizer which may result in the formation of bonds as lathionine in a less than straight configuration. Finally, no mention is made as to how to eliminate waviness often seen after the relaxing process. This waviness is often referred to as reversion or under processing.

United States Patents Nos. 4,719,099 to Grollier and 4,592,908 to Wajaroff dislcose and claim a conditioner and a protective cream to prevent burning of the scalp, respectively. In effect, the products cited in the prior art are formulated to be used with an alkaline hair relaxer in order to prevent the burning of the scalp or to repair damage to the hair caused by the relaxation process, and are not, as in the present invention, formulated to neutralize the alkaline hair relaxer on the hair, to bring the hair to a pH of below 7, preferably below 5, and ideally between 2 and 3, such that bonds hydrolyzed during the relaxing process are reformed permanently into the styled configuration, while simultaneously preventing damage to the hair caused by the relaxation process. The products disclosed and claimed in the prior art are not formulated to allow this to happen, and result in staightened hair, which then is styled in the conventional manner. Prior art products are formulated to be used after the straightening process is complete; the present invention is formulated to be used during the straightening process, filling a long felt, but as yet unfilled need in the hair-care industry. The present invention is a rinse for neutralizing an alkaline hair relaxer, for bringing the hair to a pH in the acid range thus allowing the bonds to reform permanently, resulting in a permanent hair style.

The Grollier patent discloses a conditioner for the treatment of dry hair, and other keratin materials, and

contains at least one anionic polymer and at least one cationic polymer. This general anionic-cationic polymer combination is comprised in the entire series of keratin-treating materials disclosed in Grollier. These compositions allow for the conditioning and repair of damaged hair, thus allowing better styling. However, when applied to hair, the Grollier patent is a two-stage, two-composition process, as disclosed in column 56, lines 64-66.

As discussed throughout the Grollier specification, the Grollier composition is formulated to attach anionic and cationic polymer to the hair, apparently at the same time. The Grollier composition consists essentially of an anionic polymer, a cationic polymer and a solvent medium. On the contrary, the composition of the present invention is not meant to condition the hair per se, but is meant to neutralize an alkaline hair relaxer, to bring the pH of the hair to the acidic range allowing the bonds in the hair to reform, and to minimize damage occurring to the hair from rinsing. Thus, the present invention also acts as a damage-preventing composition rather than a damage-repair composition.

The Wajaroff composition is a protective cream to prevent an alkaline chemical from burning the scalp during, for example, a hair relaxation process, and contains a pH indicator for indicating whether enough of the protecting composition has been applied to the scalp to prevent the alkaline chemical hair relaxer from burning the scalp. The pH indicator contained in the Wajaroff composition is to protect the scalp.

The most likely cause of the waviness or reversion is the return of the hair to a lower pH and deswelling during or after the time the hair is manipulated into a straight configuration. The salt bonds within the hair in particular are reforming rapidly as the pH descends from

an alkaline state to neutral or below near the isoelectric point of hair. The sulfur containing amino acids are still very active before neutralization takes place. As new bonds are forming, the alignment of the bonds will occur in the position of the hair at that moment.

Conventional wisdom blamed the relaxer for the inefficiency of the straightening process. The conventional relaxer systems employ as the neutralizer a shampoo. The relaxer is rinsed from the hair for an extended period of time, perhaps up to 5 or more minutes, to remove completely the excess relaxer and the slippery feel of alkaline hair. In the salon trade, the rinsing step is considered key in producing optimum results. Many attribute neutralization properties to the water during the rinsing process. In the case of scalp sensation, water helps stop the itching, or tingling or burning sensation. However, the water is diluting the alkali and not actually providing significant reduction in pH to neutral. Water does, however, cause more swelling to the hair and very likely to the scalp as well. United States Patent No. 4,313,933 emphasizes the pH interactions and their effect on hair and scalp.

When the hair is treated with reducing and relaxing agents, an increased amount of salt is produced from the amino acids. Due to osmotic pressure, the hair shaft swells additionally, because the water seeps into the hair shaft. Water outside the hair shaft is more concentrated and the hair shaft contains a high level of salts (Shansky, A., 14 J. Soc. Cosmet. Chem. 427 (1963)). The swelling during rinsing after a treatment with thioglycolate and sodium hydroxide could be prevented using a salt solution according to J. Nothan, V. Bollert, G. Blankenburg, and H. Hockers, 1 Proceedings of the 16th IFSCC Congress 315 (Society of Cosmetic Chemists 1990).

Robert Y. Lochhead, Ph.D., of the University of Southern Mississippi, Department of Polymer Science, studied hair that was treated with sodium hydroxide and rinsed, using a special scanning electron microscope that could observe real time specimens in aqueous media. The hair cuticle in many cases split longitudinally as the hair became engorged with water. This implies that the cuticle is not pliable or elastic when swollen by this action. The longer the rinsing is allowed to continue, the greater the destruction of the cuticle, resulting in more damaged fibers. In less damaged hair fibers, significant cuticle lifting is noted. The hair becomes a polyelectrolyte. Therefore, the hair is not in a final state during rinsing. The water does dilute the alkali.

The prior art hair straightening processes teach away from the results obtained by the present invention. Recent research by Dr. Robert Y. Lochhead indicated that the hair cuticle splits during rinsing (prior art discusses rinsing for 5 minutes or more) after sodium hydroxide relation because of swelling caused by water entering the hair. However, use of the present invention helps minimize or alleviate this swelling, resulting in less-swollen, less-damaged hair, which can be styled in a permanent fashion. On the contrary, the present invention helps minimize such swelling because only minimal rinsing (less than 5 minutes) of the hair relaxer from the hair is necessary when the present invention is used.

In the salon, during the shampooing process that immediately follows the rinsing of the relaxer, if the shampoo is acidic, a sulfury odor is produced. This is sensory evidence of the mechanism of alkali cleavage of the cystine bonds and subsequent formation of a monosulfur amino acid, lanthionine. C. R. Robbins, Chemical and Physical Behavior of Human Hair, chapter 3.

Simultaneously, the cystine level of the hair is lowered.

A sulfur atom is released to the atmosphere upon completion of this reaction. This is evidence that the bonds are still forming during the neutralization process.

The neutralizing process normally is carried out with a shampoo having a pH between about 5.5 and 7. During the shampooing step, or as in the case of the preshampoo normalizer of U.S. Patent No. 4,602,648, hair is manipulated. Since bonds are still reforming at this stage, hair is positioned in a less than straight or wavy pattern as the crosslinking and restructuring of peptide and salt bonds are occurring. This may result in a permanent setting of hair in this type of pattern, that could be interpreted as reversion or under processing, and is attributed to the relaxer not being efficient.

During the prior art hair straightening (or waving or curling) processes, an alkaline hair relaxer is placed in the hair. The alkaline hair relaxer cleaves or hydrolyses bonds in the hair such that the hair will lie straight. In the prior art processes and using prior art products, the hair then is shampooed to remove the hair relaxer, and the hair is styled to the desired configuration. Like most stylings, hair styled after the hair relaxer and shampoo treatment does not result in a permanent style.

Prior art neutralizing shampoos are used to remove excess alkali residue left on the hair from the hair relaxer. The neutralizing shampoos are applied to the hair after the alkali hair relaxer is rinsed from the hair. On the contrary, the neutralizing rinse claimed in the present invention is applied directly to the hair after minimal rinsing of the alkaline hair relaxer from the hair. Salon tests show that permanent reconfiguration of the hair occurs at a pH of 7 or less, and most efficiently below a pH of about 5. The acidic conditioners available are not strong enough to produce a permanent wave without reversion, due to their

formulation. The present invention consistently allows a permanent wave to be placed in the hair.

United States Patent No. 4,361,157 describes a method of curling hair without rollers. Strong alkaline solutions are allowed to remain in contact with the hair for 10 to 15 minutes, a time period that is less than the time required to effect a complete straightening or high enough cystine bond breakage to effect a completely straight pattern. Enough of the natural curl is left to add body and curl or wave. The hair is then shampooed and rinsed. The shampoo contains chemicals for neutralizing the hair straightener. A hair softener is applied for softer waves and a rinse set for more defined waves; permanent waves are formed without the use of rollers. Interestingly, important to this method is wetting the hair prior to the application of the relaxer. It is disclosed that only 70% to 90% of the time of exposure to the hair straightening chemicals is required for a complete straightening process. The hair is washed with a neutralizing shampoo and rinsed. A diluted rinse set composition then is applied to the partially straightened hair, presumably a setting lotion preparation employing resins and or polymers. The prewetting of the hair prior to the application of a relaxer can cause the emulsion to break down faster and release the alkali too soon. This can cause loss of control of the straightening process, scalp irritation, and more bonds than desired to be broken. It is not clear why the prewetting is desirable in this process, nor whether the hair is rinsed prior to washing with the shampoo. If the shampoo is added directly to the relaxer, the shampoo may not be sufficient to bring the pH down low enough for efficient neutralization. It is not mentioned how many times the shampooing must be done. The hair must be manipulated

during the shampooing process, thus exposing hair to any type of curl or wave pattern, thus losing control.

There is an alternative to the aforementioned patents in terms of minimizing hair damage and providing curl or wave patterns without the use of rollers. That is the subject of the present invention.

BRIEF SUMMARY OF THE INVENTION

Briefly stated, this invention is a neutralizing rinse comprising an acid, a hydroxyalkylcellulose thickener such as hydroxyethylcellulose and/or hydroxymethylcellulose, a wetting agent, a color indicator, an optional opacifier, laureth 23, an optional conditioner, and an optional fragrance. The product aids in the chemical relaxation of hair so as to allow hair to be straightened, curled or waved, and helps reduce the swelling and subsequent damage to the hair and scalp caused by the rinsing products and process. Additionally, the invention includes the novel method of applying the product during the straightening process, comprising the steps of first pre-treating or protecing the hair and then applying the relaxer, then applying the product as the neutralizing rinse. A moisturizing conditioner then can be applied to the hair.

It is accordingly an object of the present invention to provide a product that is formulated so as to achieve the function of neutralizing alkaline residue and causing permanent formation of new bonds in the hair shaft in the desired wave or hair configuration.

It is another object to provide a product which facilitates the forming of the bonds quickly to reduce damage to the hair by swelling.

It is yet another object to provide a product and method which minimizes hair fiber swelling by specifying the length of time of rinsing the relaxer.

It is still another object to provide a method having a limited rinsing time to avoid excessive swelling of hair and scalp, therefore eliminating excessive damage.

Another object is to provide a product which assists deswelling the hair shaft caused by the alkali and rinsing.

Yet another object is to provide a product which, due to its low pH, can neutralize the alkali in the relaxer on the scalp when the scalp is experiencing irritation from the alkali, thus ceasing the sensation.

Still another object of this invention and process is to allow more processing time if needed for the hair to be processed to a straighter configuration if applied to the scalp where sensation is noted.

It is a further object to provide a product and method which, by applying the product directly to the scalp where sensation such as itching and possibly tingling occurs, can prevent serious scalp burns from forming.

It is an additional object of this invention to facilitate the permanent new bond formation in the desired wave pattern with the use of a preconditioner treatment applied to the hair prior to the relaxer which aids in combability to accomplish the wave shaping process.

It is one more object of the present invention to facilitate the permanent new bond formation in the desired wave pattern by the incorporation of at least one conditioning agent to aid in combability and to facilitate the combing and wave shaping process.

A further object is to provide a method in which a shampoo is not needed to remove the rinse or the relaxer from the hair, thus further minimizing cuticle lifting and stress.

An additional object of this invention is to provide a product and method which incorporate conditioners that aid in strengthening the hair.

One more object of this invention is to provide a product and method in which the previously processed hair not the object of straightening at the time of relaxing is protected by the conditioners employed either in the pretreatment or the neutralizer.

These objects, and other objects, features and advantages of the present invention, will become apparent to one skilled in the art when the following detailed description is read in conjunction with the included examples.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention and method relates to compositions and methods for relaxing and straightening human hair, particularly addressing the secondary straightening during the neutralization process. The product is applied directly to the hair after some or most of the reducing agent is rinsed from the hair with the time of rinsing specified to less than 5 minutes, with the optimum time of 1/2 to 2 minutes for short hair, 2-3 minutes for medium length hair, and up to 4 minutes for long hair. This invention and process can be used in conjunction with any alkaline reducing agents used in the straightening and permanent wave processes. It can be used with chemicals in the category of sodium hydroxide, potassium hydroxide, guanidine hydroxide, lithium hydroxide, calcium hydroxide, amino hydroxide, ammoniated amino hydroxide, enzyme relaxers and the like. The chemical agents used in permanently altering the structure of the hair and the subsequent damage incurred using these agents and by extensive rinsing and manipulation of the hair during the shampooing further damages the hair and reduces the effectiveness of the smoothing and shaping technique while the relaxer or straightener is on the hair.

1. PRODUCT

The present invention helps reduce stress to the hair. The invention is a low pH formula that may contain one or more acids, such as citric acid, maleic acid, boric acid, lactic acid, phosphoric acid, and the like. In the present invention, citric acid is the preferred acid and used in a range of 0.1% by weight to 5.0% by weight, with a preferred range of 1.0% to 4.0% by weight. The product may be formulated as a liquid, gel, suspension, colloid, paste, cream or lotion. In this invention, the preferred embodiment formula is a liquid thickened to prevent dripping while styling the hair in the desired pattern. The invention is thickened to a preferred range of 1,000 to 3,000 cps, Brookfield, with hydroxyethylcellulose at a range of 0.1% to 5.0% by weight, with a preferred range being enough to effect the above viscosity.

The product further comprises a wetting agent to facilitate penetration of the product into the hair shaft. Suitable wetting agents include polysorbates and other mild nonionic surfactants, with a range of 0.1% to 10.0% by weight. The optimum range is 1.0% to 5.0%. An opacifier also may be used for aesthetic purposes; that is, to please the eye, it having a primary purpose of enhancing the visual detection of the color indicator on an alkaline medium. Opacifiers of any kind may be used, with the caution that too waxy an opacifier, a feature common to glyceryl stearate and emulsifying wax, especially if employed at higher concentrations, will prevent penetration of the invention formula into the hair shaft. In the present invention, the preferred opacifier used is styrene acrylate copolymer in a range up to 8.0% by weight, with a preferred range of 0.3% to 2.0%.

The invention further comprises phenolphthalein as the color indicator to observe the presence of alkali. The range of phenothalein is 0.001% to 1.0% by weight.

The preferred phenolphthalein is 100% active and solubilized with laureth 23 an emulsifier which is the polyethylene glycol ether of lauryl alcohol (q.v.) that conforms to the formula:

$$CH_3(CH_2)_{30}CH_2(OCH_2CH_2)_nOH--.$$

Laureth 23 is incorporated in a range of 0.1% to 8% by weight, with a preferred range of 0.4% to 2.0%.

This invention further comprises a conditioner that aids in combability, particularly during the neutralizing process. The preferred conditioner used in this invention is polyquaternium 32, a highly cationic modified polyacrylamide dispersed in mineral oil. It is provided in the range up to 9.0% by weight with a preferred range of 1.0% to 3.0%. The conditioner does not interfere with the penetration of the formula in the preferred range. Fragrance also may be incorporated at a range of 0.0% to 1.0% by weight.

TABLE I

Product Composition

Component	Range (wt. %)	Preferred Range (wt.%)
Acid	0.1-5.0	1.0-4.0
Hydoxyethyl-cellulose	0.1-5.0	
Wetting Agent	0.1-10.0	1.0-5.0
Opacifier	up to 8.0	0.3-2.0
Phenol-phthalein	0.001-1.0	
Laureth 23	0.1-8.0	0.4-2.0
Conditioner	up to 9.0	1.0-3.0
Fragrance	up to 1.0	
Water	balance	
Methyl-cellulose	up to 1.0	0.25

This invention is made by adding the hydroxyethylcellulose to water with rapid agitation to prevent clumping and to facilitate complete hydration of the polymer. The citric acid is added using moderate speed agitation when the hydration is completed. After the batch is clear and uniform, the pre-solubilized phenothalein in laureth 23 is added and mixed well. The opacifier is added to the batch with moderate agitation. The conditioner then is added. No heat is necessary to make this formula. Fragrance is optional.

If the conditioner is not used (0.0%) in this invention, a preconditioner which employs this conditioner should be used to assist in detangling and combability, a key to the function of this invention. The preconditioner comprises from 0.1% to 10.0% by weight crotein WKP, kerasol, with a preferred range of from 1.0% to 5.0%; from 1.0% to 7.0% by weight hydrolized wheat protein, with a preferred range of 1.0% to 3.0%; and 1.0% to 5.0% by weight amino acid Salts, with a preferred range of 2.0% to 4.0%.

The preferred conditioner applied as a pretreatment comprises from 0.1% to 9.0% by weight polyquaternium 32, with a preferred range of 1.0% to 3.0%. The preconditioner also comprises a new product hydrolyzed wheat protein containing oligosaccharides in which the daltons are high, to help keep the hair from breaking. The preconditioner also comprises emulsifiers and surfactants, fragrance and preservatives that are a necessary vehicle for the conditioners to be delivered. The emulsifier preferrably is supplied at a range of 0.2% to 5.0% by weight. Suitable emulsifiers include waxy ester or wax or a fatty alcohol. The surfactants and solubilizers may be polysorbates or other mild nonionic surfactants. Fragrance and preservatives are recommended in a range of 0.01% to 1.0% by weight, whatever the

manufacturer recormnends and is effective for their purposes.

TABLE II

Preconditioner Composition

Component	Range (wt. %)	Preferred Range (wt.
Crotein WKP, kerasol	0.1-10.0	1.0-5.0
Hydrolized Wheat Protein	1.0-7.0	1.0-3.0
Amino Acid Salts	1.0-5.-	2.0-4.0
Conditioner	0.1-9.0	1.0-3.0
Emulsifier	0.2-5.0	
Fragrance and Preservative	0.01-1.0	
Water	balance	

The use of the preconditioner is necessary when the neutralizing rinse does not contain the cationic conditioner that aids in the combability need for hair shaping during the neutralizing stage. For severely damaged hair ends, particularly in the case of bleached and colored hair, the pretreatment is important to protect the hair from the incidental contact with the relaxer directly and during the rinsing procedure. It also is highly effective in protecting the hair ends from acidic contact during the neutralizing process. Acidic products tend to cause slight swelling in normal virgin hair, and more exaggerated swelling in bleached hair in the pH range of 2 to 3.0. This is cited in G. Ramachandra Bhat, Rogerio M. Parreira, Elvin Lukenbach, Donald L. Harper and Helio C. Parreira, Acid-Base Characteristics of Human Hair: Absorption of HCl and NAOH, and the Effects on Physical Properties, 32:7 J. Soc. of Cosm. Chem. (1981),

incorporated herein and made a part hereof by this reference.

The preconditioner is made in a similar manner to the neutralizing rinse, and comprises generally the same components. The emulsifying agents must be melted and added to the batch.

2. PROCESS

The process for effective neutralization comprises the following steps: If using the neutralizing rinse without the conditioner incorporated, or if the hair that has been previously processed is very damaged, overly porous, bleached or colored, the preconditioner is applied to the hair, and dried in with a cool dryer. The alkaline relaxer is applied in the conventional manner, and the hair is processed to the desired straightness. The bulk of the relaxer is then rinsed, for the specified time range of about 1/2 to 2 minutes for short hair, about 2 to 3 minutes for medium length hair, and about 3 to 4 minutes for long hair, to achieve the object of removing the relaxer iii order for the neutralizing rinse to penetrate to the hair.

The neutralizing rinse is applied to the hair, saturating first the freshly relaxed hair, and subsequently pulling out to the ends and reapplying the neutralizing rinse, if necessary, to fully wet the hair and to areas showing pink color, indicating alkaline conditions. The hair is combed gently into the desired wave pattern or hair configuration. The hair may be combed straight, directed forward, backward, side to side, down, or round, as in the style termed "The Wrap", or placed on perm rods. The neutralizing rinse is allowed to sit on the hair for about 3 minutes. During this time the bonds are forming in the desired configuration. Many bonds form as soon as the neutralizing rinse contacts the

hair as evidenced by the sulfury odor. Experiments show that enough bonds are still active during the combing such that the hair is permanently structured in the arrangement combed in at the time of neutralization. The amount of neutralizing rinse applied varies with the length of the hair also. The recommended amounts of neutralizing rinse to be applied are as follows: about 1 fluid oz. to 2 fluid oz. for short hair, about 2 fluid oz. to 3 fluid oz for medium length hair, and about 3 to 6 fluid oz. for long hair.

EXAMPLE 1

In the salon testing program the entire relaxer system was used. Nine people experienced some level of scalp sensation, for example, itching, tingling, and in a case, burning, while having the relaxer applied during the smoothing process. The neutralizing rinse was applied directly to the sensation area on the scalp. The sensation stopped immediately. In the one case of burning, the sensation decreased in strength from a burning sensation to an itching to tingling sensation.

Scalp irritation from the relaxer is very common, particularly if the scalp has been rubbed or scratched close to the time of relaxing. The patrons in the salon must inform the hairdresser at the first sign of itching. If the neutralizer is applied directly to the itching spot, the sensation will end, and the alkali from the relaxer neutralized. The best way to apply the neutralizing rinse to insure precision is via a small orifice in a pointed cap on a low density plastic bottle, as in the hair color applicator bottles commonly used in the salons.

EXAMPLE 2

In the salon, eight people were successfully given a permanent wave pattern in the direction of the desired style. Shorter hair yielded a wave pattern that normally would have to have been mechanically produced with styling aids. One patron shampooed 3 times in 4 days and the desired wave pattern that was placed in at the time of neutralization was still present. The wave pattern in one model was so strong in direction that it had to be mechanically set to get another pattern. The set was effective. The wave that was set in during the neutralization gave excellent appearance and body. One model was particularly happy with the feel of her scalp after the process.

EXAMPLE 3

The formulation is very important to the effectiveness of the setting of the hair and the comfort to the patron. One model who experienced burning on the scalp during the relaxer process was subsequently treated with the neutralizing rinse using phenolphthalein solubilized in alcohol, which stopped the intensity of the sensation. However during the application of the neutralizing rinse, in the same area a stinging sensation occurred. The alcohol in which the phenolphthalein was solubilized caused the unpleasant sensation. Therefore, laureth 23 was used in place of alcohol to solubilize the phenolphthalein to avoid this problem.

The use of conditioner, namely that of polyquaternium 23, is a preferred option in the process. When no preconditioner was used, and the neutralizer did not contain the conditioner, on a person with a hair tint in her hair, the hair ends became soft and sticky. In other tests, the models' hair could not be combed during the neutralizing step, because the hair was tangled. In

another test where the model had color in the previously relaxed hair, breakage occurred at the point where the freshly relaxed hair met the previously colored and relaxed hair. When either the preconditioner is used with the rinse that did not contain the conditioner, the combing was easy and the hair bonded in the desired pattern.

EXAMPLE STEPS

The preferred method is as follows:

1. Perform a preliminary strand test according to the following instructions for the relaxer. Also a patch test is recommended for the invention.

2. Apply a pretreatment to the perimeter hairline area, and the entire scalp. Apply to previously chemically treated hair making sure to get an even distribution. Do not rub scalp. Gently comb through.

3. Section the hair into 4 parts. Make narrow partings. Apply relaxer to the hair as close to base as possible without getting on the scalp (about 1/4"). Start at nape, work up to front, then sides; hairline last. Do not apply to scalp.

4. After applying evenly to the new growth or all over virgin hair, smooth the hair until the desired relaxation has occurred. Use the recommended process times.

<u>Process times (from time of application to rinse out)</u>:

Mild (for fine, porous or color treated hair)	13 minutes
Regular (for medium texture and medium porosity)	15 minutes
Super (for coarse texture and low porosity)	18 minutes

5. During the relaxer service, to stop chemical reaction and stop any scalp sensation, apply the Invention

directly to the sensitive area after gently removing excess relaxer. Reapply if necessary. Continue with the service.

6. When desired straightness is achieved, rinse hair until relaxer is just rinsed out, approximately 2-1/2 to 3 minutes. Do not prolong rinsing time. Water is not a neutralizer. Then generously apply the Invention.

7. Do not massage into hair. Comb through. Form hair into the desired wave pattern. Observe the pink color to monitor the process of neutralizing. After initial application, reapply in pink areas until clear. After setting in the desired wave pattern and no pink color is present, time for 10-15 minutes under a dryer with a cap or at room temperature with a cap for 20 minutes.

8. Rinse thoroughly from hair.

9. If desired for patron service, shampoo hair once. Rinse out shampoo thoroughly.

10. Towel blot hair.

11. Apply a conditioner generously all over hair. Leave in until the desired level of conditioning is achieved.

12. Rinse out the conditioner thoroughly.

13. Apply a styling lotion evenly over hair. Roller set or blow dry the hair, style and dry under a dryer.

14. Apply a small amount of a condition and scalp normalizer to scalp and hair before final comb out.

15. Apply a very small amount of a shine enhancer and sealant to add a brilliant shine to the hair.

16. Spray a holding spray lightly to finish style.

REBOUNDER TREATMENT

Typically two weeks after the relaxer is given (or one week if ends are particularly dry), it is advantageous to give a second treatment to permanently strengthen the hair. The Invention deswells the hair, softens and

temporarily straightens the new growth. It also may be used to give a temporary to semi permanent set to the hair. It also is excellent for general reconstructive conditioning for dry embrittled hair, color treated and permanently waved hair. The second treatment is as follows:

1. Shampoo hair once.

2. Generously apply the Invention. Comb through and style if desired to give a semi permanent set, or comb through for conditioning only. Allow to sit under a cap in the dryer for 10 minutes or at room temperature under a cap for 15 - 20 minutes.

3. Rinse thoroughly. Shampoo hair again.

4. Finish the conditioning with a conditioner for 5 minutes or until the desired conditioning and moisturizing level is achieved. Rinse thoroughly.

5. Apply a styling lotion or a forming gel to style as desired.

6. Apply a hair conditioning and scalp normalizer to the scalp and hair.

7. To add extra shine and seal the hair, use a small amount of a shine enhancer and sealant.

8. To finish the style spray a holding spray.

To maintain the style after the hair has been treated with the invention, repeat steps 1 and 4-7 as necessary.

The above detailed description and examples are provided for illustrative purposes of the best mode for the invention known by the inventors at this time, and are not intended to limit the scope of the invention and its equivalents, as defined in the appended claims.

What is claimed is:

1. A neutralizing rinse for use in neutralizing an alkaline chemical relaxer in a process for the chemical relaxation of hair, comprising:

a. an acid selected from the group consisting of citric acid, maleic acid, boric acid, lactic acid, and phosphoric acid, said acid being present in a range of from about 0.1% to 5.0% by weight;

b. a thickener selected from the group consisting of hydroxyalkylcelluloses, said thickener being present in a range of from about 0.1% to 5.0% by weight;

c. a wetting agent selected from the group consisting of non-ionic surfactants, said wetting agent being present in a range of from about 0.1% to 10% by weight;

d. a pH indicator, said pH indicator being present in a range of from about 0.001% to 1.0% by weight; and

e. laureth 23 as an emulsifier, said emulsifier being present in a range of from about 0.1% to 8.0% by weight; wherein, said rinse having a pH of below 7.0, said acid being present in a quantity sufficient to bring the pH of the hair below 7.0 for reforming bonds in the hair, and said pH indicator being present in a quantity sufficient for allowing indication of the presence of the alkaline chemical relaxer on the hair.

2. The neutralizing rinse as claimed in Claim 1, wherein said acid is selected from the group consisting of citric acid, maleic acid, boric acid, lactic acid, and phosphoric acid.

3. The neutralizing rinse as claimed in Claim 2, wherein said acid is present in a range of from about 0.1% by weight to 5.0% by weight.

4. The neutralizing rinse as claimed in Claim 1, wherein said hydroxyethylcellulose is present in a range of from about 0.1% to 5.0% by weight.

5. The neutralizing rinse as claimed in Claim 1, wherein said thickener is present in a range such that the viscosity of the rinse is in the range of from about 1,000 cps to about 3,000 cps.

6. The neutralizing rinse as claimed in Claim 1, wherein said wetting agent is polysorbate.

7. The neutralizing agent as claimed in Claim 6, wherein said wetting agent is present in the range of from about 0.1% to 10% by weight.

8. The neutralizing rinse as claimed in Claim 1, further comprising an opacifier, said opacifier being present in a range up to about 8.0% by weight.

9. The neutralizing rinse as claimed in Claim 8, wherein said opacifier is styrene acrylate copolymer.

10. The neutralizing agent as claimed in Claim 8, wherein said opacifier is present in a range up to about 8.0% by weight.

11. The neutralizing rinse as claimed in Claim 1, wherein said pH indicator is phenolphthalein.

12. The neutralizing rinse as claimed in Claim 11, wherein said color indicator is present in the range of from about 0.001% to 1.0% by weight.

13. The neutralizing rinse as claimed in Claim 1, wherein said laureth 23 is present in the range of from about 0.1% to 8.0% by weight.

14. The neutralizing rinse as claimed in Claim 1, further comprising polyquaternium 32 as a conditioner, said conditioner being present in the range of up to about 9.0% by weight.

15. The neutralizing rinse as claimed in Claim 14, wherein said conditioner is polyquaternium 32, a highly cationic modified polyacrylamide dispersed in mineral oil.

16. The neutralizing rinse as claimed in Claim 15, wherein said conditioner is present in the range of 0.0% to about 9.0% by weight.

17. A method of straightening hair, comprising the steps of:

a. applying a preconditioner or pretreatment to the hair;

b. applying a relaxer formulated to bring about cleavage of the disulfide bonds to create the typical amino acid, lanthionine, to the hair;

c. rinsing the relaxer for a specified time;

d. applying a neutralizing rinse;

e. styling the hair into the desired wave pattern or hair configuration;

f. allowing the hair to sit for at least about 3 minutes;

g. rinsing the neutralizer from the hair; and

h. applying a conditioner to the hair.

18. The method as claimed in Claim 17, wherein said specified time is from one-half to 2 minutes for short hair, from 2 to 3 minutes for medium length, and from 3 to 4 minutes for long hair.

19. The method as claimed in Claim 17, wherein said neutralizing rinse is applied by thoroughly saturating first the freshly relaxed hair then combing through to the ends adding more if necessary to keep soft and easy to comb.

20. A method for producing the neutralizing rinse as claimed in Claim 1, comprising the steps of:

a. incorporating hydroxyethylcellulose to water;

b. rapidly agitating the hydroxyethylcellulose and the water to facilitate complete hydration of the polymer to form a mixture;

c. adding the acid to the mixture using moderate agitation;

d. solubilizing laureth 23 in phenolthaline;

e. adding the pre-solubilized phenothalein in the laureth 23 to the mixture;

f. adding the opacifier using moderate agitation; and

g. adding the conditioner to the mixture.

21. The neutralizing rinse as claimed in Claim 1 having a pH of below about 5.5.

22. The neutralizing rinse as claimed in Claim 21 having a pH of between about 2.0 and about 3.0.

23. The neutralizing rinse as claimed in Claim 22, wherein said opacifier is present in the range of from about 0.3% to 2.0% by weight.

24. The neutralizing rinse as claimed in Claim 23, wherein said laureth 23 is present in the range of from about 0.4% to 2.0% by weight.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US92/05691

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :A61K 7/09
US CL :424/71

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 424/70

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS Search terms: neutralizer, color indicator, PH indicator, phenolphthalein

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	US,A, 4,719,099 (Grollier et al.) 12 January 1988, column 57, lines 24-27; column 45, line 52-54; column 46, lines 42-43; column 53, lines 50-52; column 57, lines 9-12.	1-24
Y	US,A, 4,592,908 (Wajaroff et al.) 03 June 1986 column 3, lines 34-44.	1-24
Y	US,A, 4,349,537 (Forbriger, Jr.) 14 September 1982 column 50 lines 6-11.	9-10
A	US,A, 4,369,037 (Matsunaga et al.) 18 January 1983 column 16.	1-24

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

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