

1

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HAIR-SETTING COMPOSITION

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9 Claims

ABSTRACT OF THE DISCLOSURE

A hair-setting lotion is provided which is comprised of an aqueous solution of a reaction product of a water-soluble alkylene polyamineepichlorohydrin resin and a water-soluble material such as sodium sulfite.

This invention relates to novel hair-setting compositions or lotions and to their use in setting hair.

Two primary methods are employed in the art of hair dressing. In one of these, called "permanent waving," the configuration of individual hair fibers is substantially permanently changed to impart a curl or wave to the hair. A permanent waving process involves the use of chemical agents which react with the material of the hair fibers to soften and/or change it chemically in order to achieve a desired permanently waved configuration. This process can be carried out either at approximately room temperature, the process then being called "cold permanent waving," or at an elevated temperature.

The second process involved in hair dressing is that of setting the hair; that is, imparting to the hair a temporary set or temporarily changed configuration for the purpose of obtaining a particular hair style. This temporary set is changed whenever the hair style is changed. The hair-setting process can also be carried out either at room temperature or at elevated temperature, and in the past there have been employed certain water-soluble gums and resins for imparting a temporary set to hair.

In the case of permanently waved hair the curl or wave in the hair remains substantially unaltered for the remainder of the life of the hair under ordinary conditions. A hair set, however, is not permanent but is generally removed by wetting the hair with water. Usually, the hair set is removed by shampooing the hair with mild shampoo.

The present invention is directed to a novel hair-setting composition for use in imparting a temporary set to hair.

In accordance with this invention there is provided a novel hair-setting composition comprised of an aqueous solution of a water-soluble resinous material. The hair-setting composition of this invention can be used to impart a highly satisfactory temporary set to hair which has good resistance to high humidity. The hair-setting composition is applied to water-damp hair, usually in the form of a fine spray, and the thus treated hair is set to a desired configuration usually by use of rollers. The treated hair is subsequently dried. The water-soluble resinous material deposited on the hair provides the desired set-holding characteristic until removed. The deposited resinous material is essentially tack free and remains so even when the hair is exposed to conditions of high humidity. The resinous material deposited on the hair can be easily and readily removed, despite its resistance to humid conditions, by washing with a mild shampoo whereby the hair-set is removed and the hair can be reset and restyled, if desired.

The water-soluble resinous material of this invention is the reaction product derived by reaction of (1) a water-soluble alkylene polyamineepichlorohydrin resin, and (2) a water-soluble material selected from the group consisting of (a) water-soluble sulfites; (b) water-soluble bisul-

2

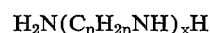
fitcs; (c) water-soluble thiosulfates; (d) water-soluble thioglycolates; and (e) mixtures of two or more. The hair-setting compositions of this invention are essentially free of sulfite anions, bisulfite anions, thiosulfate anions, and thioglycolate anions.

The amount of water-soluble material (2) used in carrying out the reaction to provide the water-soluble resinous material of this invention will be that which will provide from about 0.2 mole to 1.0 mole, and preferably from about 0.5 mole to 0.9 mole, of sulfite anion, bisulfite anion, thiosulfate anion, or thioglycolate anion per mole of epichlorohydrin moiety of the water-soluble alkylene polyamineepichlorohydrin resin (1). Reaction is carried out in aqueous media at a pH of about 4.5 to about 11, preferably at a pH of from about 6 to about 8.5, and at a temperature of from about 25° C. to about 100° C. for a period of time of from about ½ hour to 2 weeks, or longer if required. Preferred temperature range is from about 25° C. to about 80° C. Reaction time varies inversely with temperature. Reaction is carried out until essentially all bisulfite anion, sulfite anion, thiosulfate anion, and/or thioglycolate anion has reacted and there is less than about 0.15% anion present in the solution. After reaction, the solution is adjusted to a desired solids concentration and to a pH of from about 6 to about 7.5.

Examples of suitable water-soluble sulfites for use herein include sodium sulfite, potassium sulfite, and ammonium sulfite. Examples of suitable water-soluble bisulfites for use in this invention include sodium bisulfite, potassium bisulfite, ammonium bisulfite, sodium metabisulfite, potassium metabisulfite, and ammonium metabisulfite. Examples of water-soluble thiosulfates include sodium thiosulfate, potassium thiosulfate, and ammonium thiosulfate. Examples of water-soluble thioglycolates include sodium thioglycolate, potassium thioglycolate, and ammonium thioglycolate. Mixtures of two or more of the above can be used if desired.

Water-soluble alkylene polyamineepichlorohydrin resins (1) employed herein are water-soluble polymeric reaction products of epichlorohydrin and an alkylene polyamine.

Alkylene polyamines which can be reacted with epichlorohydrin have the formula



wherein n is an integer 2 through 8 and x is an integer 1 or more. Examples of such alkylene polyamines are the alkylene diamines such as ethylenediamine; propylene diamine-1,2; propylene diamine-1,3; tetramethylenediamine; and hexamethylenediamine. The polyalkylene polyamines such as the polyethylene polyamines, polypropylene polyamines, polybutylene polyamines and the like are examples of alkylene polyamines that can be used. Specific examples of these polyalkylene polyamines include diethylenetriamine, triethylenetetramine, tetraethylenepentamine, and dipropylenetriamine. Other polyalkylene polyamines that can be used include methyl bis(3-aminopropyl)amine; methyl bis(2-aminoethyl)amine; and 4,7-dimethyltriethylenetetramine. Mixtures of alkylene polyamines can be used if desired.

The relative proportions of alkylene polyamine and epichlorohydrin employed can be varied depending upon the particular alkylene polyamine used. In general, it is preferred that the molar ratio of epichlorohydrin to alkylene polyamine be in excess of 1:1 and less than 2:1. In the preparation of a water-soluble resin from epichlorohydrin and tetraethylenepentamine, good results are obtained at molar ratios of from about 1.4:1 to 1.94:1. Reaction temperature is preferably in the range of from about 40° C. to about 60° C.

3

The following examples are illustrative of this invention. All parts and percentages are by weight unless otherwise indicated.

EXAMPLE 1

To a mixture of 29.2 parts triethylenetetramine and 70 parts water is added 44.4 parts epichlorohydrin over a period of about 12 minutes with periodic cooling. After the epichlorohydrin addition is complete, the reaction mixture is heated to 75° C. and maintained at a temperature of from about 70° C. about 77° C. for about 33 minutes, at which point the Gardner-Holdt viscosity reached about I. The resulting reaction mass is diluted with 592 parts water to provide an aqueous solution that has a solids content of about 11.7% and a pH of about 6.3.

EXAMPLE 2

To 100 parts of the solution of Example 1 is added 2 parts sodium metabisulfite. Reaction is carried out at about 25° C. until bisulfite content is less than about .15%. The pH of the solution is adjusted to about 7.2 and water is added to a total weight of 334 parts. The solution is a highly satisfactory wave-set lotion.

EXAMPLE 3

A strand or tress of hair, 10 inches long and weighing 1 gram, is dampened with water. It is then sprayed with the hair-setting lotion of Example 2. The treated tress is rolled upon a roller, dried with a home-type hair dryer and combed out. The curl length is 3.5. The curled tress is hung in a high humidity chamber (75° F., 75% R.H.). After two hours exposure, the length of the curled tress is 7.5.

Thus, in accordance with the invention, there is provided a novel hair-setting composition that can be employed to impart a temporary set to hair which has good set-holding properties when exposed to conditions of high humidity.

The amount of resinous material in the hair-setting composition is from about 0.5% to 10%, by weight of the total weight of the composition, and preferably from about 1½% to about 5½% weight. Lower concentrations can be employed; however, they are not so desirable because excessively large quantities of the composition must be applied to the hair in order to obtain an adequate application of resinous material. Higher concentrations are undesirable because of the tendency to apply more resinous material to the hair than is needed. The pH of the hair-setting compositions preferably will be from about 6 to about 7.5. Required pH adjustments in this invention can be made by use of either their dilute sulfuric acid, or dilute sodium hydroxide.

The hair-setting composition of this invention can be applied to the hair in any convenient manner such as, for example, by means of a spray pump.

Additives often used in hair-setting compositions can also be incorporated into the compositions of this invention, if desired. Thus, for example, glycerine and/or water-soluble lanoline derivatives, such as ethoxylated lanolin, can be added to improve sheen or luster of treated hair. Water-soluble dyes can be added as well as perfumes and the like.

It is to be understood that the above description and examples are illustrative of this invention and not in limitation thereof.

What I claim and desire to protect by Letters Patent is:

1. A hair-setting lotion comprising an aqueous solution containing, by weight, from about 0.5% to about

4

10% of a reaction product of (1) a water-soluble alkylene polyamine-epichlorohydrin resin derived by reacting epichlorohydrin with an alkylene polyamine selected from the group consisting of methyl bis(3-aminopropyl)amine, methyl bis(2-aminoethyl)amine, 4,7-dimethyltriethylenetetraamine, ethylenediamine, propylene diamine-1,2, propylene diamine-1,3, tetramethylenediamine, hexamethylenediamine, diethylenetriamine, triethylenetetramine, tetraethylenepentamine and dipropylenetriamine, the molar ratio of epichlorohydrin to alkylene polyamine being in excess of 1:1 and less than 2:1 and (2) a water-soluble material selected from the group consisting of sodium, potassium, and ammonium sulfites, bisulfites, thiosulfates, and thioglycolates and mixtures thereof, the amount of water-soluble material (2) used to prepare the reaction product being that which will provide form about 0.2 mole to 1.0 mole of sulfite anion, bisulfite anion, thiosulfate anion, thioglycolate anion, or mixtures thereof per mole of epichlorohydrin moiety of the water-soluble alkylene polyamine-epichlorohydrin resin, said reaction product being derived by reaction of the water-soluble alkylene polyamine-epichlorohydrin resin (1) and water-soluble material (2) in aqueous media at a pH of about 4.5 to about 11 and at a temperature of from about 25° C. to about 100° C. until essentially all bisulfite anion, sulfite anion, thiosulfate anion, thioglycolate anion, or mixtures thereof has reacted and there is less than 0.15% anion present.

2. The hair-setting lotion of claim 1 wherein the pH of the aqueous solution is from about 6 to about 7.5.

3. The hair-setting lotion of claim 1 wherein the alkylene polyamine moiety of the alkylene polyamine-epichlorohydrin resin is diethylenetriamine.

4. The hair-setting lotion of claim 1 wherein the alkylene polyamine moiety of the alkylene polyamine-epichlorohydrin resin is triethylenetetramine.

5. The hair-setting lotion of claim 1 wherein the amount of water-soluble material (2) used is that which will provide from about 0.5 mole to 0.9 mole of the anion of the water-soluble material per mole of epichlorohydrin moiety.

6. The hair-setting lotion of claim 5 wherein the pH of the aqueous solution is from about 6 to about 7.5.

7. The hair-setting lotion of claim 5 wherein the alkylene polyamine moiety of the alkylene polyamine-epichlorohydrin resin is diethylenetriamine.

8. The hair-setting lotion of claim 5 wherein the alkylene polyamine moiety of the alkylene polyamine-epichlorohydrin resin is triethylenetetramine.

9. In the method of providing a temporary wave set to hair wherein there is applied to water-damp hair a wave-setting lotion, the thus treated hair being subsequently styled to the desired configuration, the improvement wherein the hair-setting lotion employed is the hair-setting lotion of claim 1.

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