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HAIR-SETTING COMPOSITION

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This invention relates to a hair-setting composition and pertains more specifically to a hair-setting composition having improved properties.

In the art of hair dressing two principal processes are employed. In one of these, called "permanent waving," the configuration of the 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 the desired permanently waved configuration. This process may be carried out either at approximately room temperature, the process then being called "cold permanent waving," or at an elevated temperature. The second principal process involved in hair dressing is that of setting the hair; i.e., 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 may also be carried out either at room temperature or at elevated temperature, and in the past there have been employed a variety of lacquers and other coating materials for imparting the desired temporary set to the hair as well as the mere use of heat. 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 all ordinary conditions. A hair set, however, is not permanent, but is generally removed by wetting the hair with water or even by exposure to a relatively humid atmosphere.

The present invention is concerned with a hairsetting composition for use in imparting a temporary set to the hair.

As pointed out above, it has hitherto been proposed to employ lacquers for imparting a temporary set to the hair. However, since lacquers include a water-insoluble film-forming ingredient, it has been extremely difficult to remove them from the hair. When it is desired to change the hair style, it sometimes becomes necessary to employ a special solvent or a powerful detergent composition, neither of which is readily available in the home; and lacquers have generally been considered unsatisfactory for application to the hair for this reason. A number of water-soluble film-forming resinous materials have also been proposed for application to the hair in order to set it. However, such water-soluble materials have not been completely satisfactory because of the tendency for the resultant film to become tacky and for the hair to lose its set when exposed to conditions of high humidity.

One object of the present invention is to provide a novel hair-setting composition having improved set-holding characteristics when the hair treated with it is exposed to conditions of high humidity.

Another object is to provide a hair-setting composition which retains a dry non-tacky surface even when exposed to conditions of high humidity.

Still another object is to provide a hair-setting composition which makes it possible, after the composition has been applied to the hair and the hair has once been set, to re-set the hair simply by dampening it with water.

Still a further object is to provide a hair-setting composition which exhibits good anti-static properties when

hair treated with it is exposed to conditions of low humidity.

Still another object is to provide a hair-setting composition which includes a particular kind of substantially water-insoluble resinous material in admixture with a cationic surface active agent and which combines the aforesaid desirable properties along with the characteristic of being readily removable by a mild shampoo.

Other and further objects will be apparent from the description which follows.

It has been found that certain film-forming, substantially water-insoluble polymers and resins may be effectively employed in a hair-setting composition provided they are combined with a cationic surface active agent in the proper proportions. The resultant film deposited on the hair not only provides the desired temporary set-holding characteristics and maintains the hair in the desired configuration until removed, but it does so even when the hair is exposed to conditions of high humidity without the development of any appreciable surface tack. In addition, the hair thus treated, despite its resistance to moisture, is remarkably free from any tendency to develop static electrical charges when combed or brushed under conditions of low humidity. Furthermore, the treated hair is capable of being re-set merely by use of a water-dampened comb. Finally, the film on the hair may readily be removed, despite its resistance to moisture, by a mild shampoo.

The substantially water-insoluble, film-forming materials which have been found satisfactory for the purpose of the present invention include the following polymers and resins: substantially water-insoluble copolymers of vinyl pyrrolidone with vinyl esters of fatty acids, such as a copolymer of vinyl acetate and vinyl pyrrolidone (from 40:60 to 85:15 by weight), a copolymer of vinyl pyrrolidone and vinyl stearate (from 80:20 to 40:60 by weight), a copolymer of vinyl proprionate and vinyl pyrrolidone (50:50), a copolymer of methyl acrylate and vinyl pyrrolidone (65:35), a copolymer of lauryl methacrylate and diethylaminoethyl methacrylate (50:50); the latter copolymer may be reacted with an alkyl halide or sulfate such as methyl chloride or dimethyl sulfate to form a quaternary ammonium salt and may be used in that form in the invention.

A wide variety of cationic surface active agents may be employed in combination with the aforesaid film-forming ingredient. Anionic surface active agents have been found to be ineffective. Best results have been obtained with cationic surface active agents which are quaternary in nature, such as stearamidopropyldimethyl β-hydroxyethylammonium chloride, cetyl dimethyl benzyl ammonium chloride, cetyl dimethyl ethyl ammonium bromide, cetyl trimethyl ammonium bromide, cetyl trimethyl ammonium stearate, lauryl dimethyl benzyl ammonium chloride, diisobutyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride, and the like.

The relative proportions of film-forming material and of surface active agent must be carefully controlled in order to achieve satisfactory results. The amount of surface active agent must be at least 2% by weight, based on the weight of the water-insoluble film-forming material and is preferably from 10% to 25% by weight. Larger amounts may be employed, up to 100% by weight or more, but it is desirable to avoid unnecessarily large quantities which may not be completely soluble in the solution when packaged in a pressure container as described below.

The composition is preferably dissolved in a lower alcohol such as methyl, ethyl or isopropyl alcohol for application to the hair. These alcohols are readily volatile and are relatively free from undesirable odors. Other

volatile organic solvents such as ethyl acetate, methylene chloride, etc., may be employed, if desired.

The amount of film-forming material present in the solution is from 0.05% to 10%, preferably from 3% to 6%, by weight of the solution. While lower concentrations may be employed, they are not so desirable because excessively large quantities of the solution must be applied to the hair in order to obtain a sufficiently thick film. Higher concentrations are also undesirable because of the tendency to apply a thicker film to the hair than is needed.

While the solution of the film-forming material and of surface active agent in the alcohol or other solvent may be applied to the hair by an atomizer or in any other suitable fashion, it has been found most convenient to employ a gaseous or volatile liquid propellant and to package the mixture of propellant with the alcoholic solution in a pressure package having a valve-controlled outlet. Any of the usual gaseous or liquefied gas propellants may be employed, such as nitrogen, carbon dioxide, nitrous oxide, propane, or isobutane, or, preferably, the saturated halogenated aliphatic hydrocarbons known by the trade name "Freon" and which include, for example, 1,1-difluoroethane; 1,2-dichloro-1,1,2,2-tetrafluoroethane; trichlorotrifluoroethane; dichlorodifluoromethane; monochlorodifluoromethane; monofluorotrichloromethane; 1-monochloro-1,1-difluoroethane; or mixtures thereof. The amount of volatile liquid propellant employed may vary over a wide range depending upon whether and to what extent the film-forming material is soluble in it, larger quantities being employed when it dissolves the film-forming material. Generally, the entire amount of volatile liquid propellant will be from 100% to 300%, preferably not over 230%, by weight of the solution of film-forming material and surface active agent. It is essential that the film-forming material and surface active agent both remain dissolved in the alcoholic or other solvent when the volatile liquid propellant has been mixed therewith.

The following specific examples are intended to illustrate more clearly the nature of the present invention without acting as a limitation upon its scope.

Example 1

The following solution was prepared, in which the parts are by weight:

	Parts
Copolymer of vinyl acetate and vinyl pyrrolidone (85:15)	1.6
Cetyl trimethyl ammonium bromide	0.3
Ethyl alcohol	28.1

This solution was packaged in a conventional pressure container together with 45.5 parts by weight of monofluorotrichloromethane and 24.5 parts of dichlorodifluoromethane. When sprayed on a hair tress held in a desired configuration and allowed to dry, the composition was found to provide satisfactory set-holding characteristics even under conditions of high humidity.

Example 2

The following solution was prepared, in which the parts are by weight:

	Parts
Copolymer of vinyl pyrrolidone and vinyl stearate (80:20)	1.5
Stearyl dimethyl benzyl ammonium chloride	0.3
Ethyl alcohol	28.2

The solution was loaded into a conventional pressure package along with volatile propellants as described in Example 1 above. When sprayed on a hair tress, it was found to have substantially the same set-holding characteristics as the composition of Example 1.

Example 3

The following solution was prepared, in which the parts are by weight:

	Parts
Copolymer of vinyl pyrrolidone and vinyl propionate (50:50)	1.20
Cetyl trimethyl ammonium bromide	0.25
Perfume	0.15
Ethyl alcohol	28.40

The solution was loaded into a conventional pressure package along with volatile propellants as described in Example 1 above. When sprayed on a hair tress, it was found to have substantially the same set-holding characteristics as the composition of Example 1.

Example 4

The following solution was prepared, in which the parts are by weight:

	Parts
Copolymer of lauryl methacrylate and diethylaminoethyl methacrylate (50:50) quaternized with dimethyl sulfate	0.8
Stearyl dimethyl benzyl ammonium chloride	0.3
Ethyl alcohol	28.9

The solution was loaded into a conventional pressure package along with volatile propellants as described in Example 1 above. When sprayed on a hair tress, it was found to have substantially the same set-holding characteristics as the composition of Example 1.

Example 5

The following solution was prepared, in which the parts are by weight:

	Parts
Copolymer of vinyl acetate and vinyl pyrrolidone (60:40)	1.60
Stearyl dimethyl benzyl ammonium chloride	0.30
Perfume	0.12
Ethyl alcohol	27.98

The solution was loaded into a conventional pressure package along with volatile propellants as described in Example 1 above. When sprayed on a hair tress, it was found to have substantially the same set-holding characteristics as the composition of Example 1.

Although specific embodiments of the invention have been described herein, it is not intended to limit the invention solely thereto, but to include all of the obvious variations and modifications within the spirit and scope of the appended claims.

What is claimed is:

1. An improved hair-setting composition comprising (1) from 3 to 6% by weight of a film-forming material selected from the class consisting of a copolymer of vinyl acetate and vinyl pyrrolidone from 40:60 to 85:15 by weight, a copolymer of vinyl pyrrolidone and vinyl stearate from 80:20 to 40:60 by weight, a copolymer of vinyl propionate and vinyl pyrrolidone 50:50 by weight, a copolymer of methyl acrylate and vinyl pyrrolidone 65:35 by weight, a copolymer of lauryl methacrylate and diethylaminoethyl methacrylate 50:50 by weight, and quaternary ammonium salts of the last-said copolymer, (2) at least 2% by weight, based on the weight of said film-forming material, of a cationic surface active agent, and a volatile organic solvent for said material and said agent.

2. An improved hair-setting composition comprising from 3 to 6% by weight of a film-forming copolymer of vinyl pyrrolidone with vinyl acetate, from 15:85 to 60:40 by weight, from 2% to 100% by weight, based on the weight of said copolymer, of a quaternary cationic surface active agent, and a volatile organic solvent for said copolymer and said agent.

3. A hair-setting composition as defined in claim 2

in which said copolymer contains 40% vinyl pyrrolidone and 60% vinyl acetate.

4. An improved hair-setting composition comprising a lower alcoholic solution of (1) from 3 to 6% by weight of a film-forming material selected from the class consisting of a copolymer of vinyl acetate and vinyl pyrrolidone from 40:60 to 85:15 by weight, a copolymer of vinyl pyrrolidone and vinyl stearate from 80:20 to 40:60 by weight, a copolymer of vinyl propionate and vinyl pyrrolidone 50:50 by weight, a copolymer of methyl acrylate and vinyl pyrrolidone 65:35 by weight, a copolymer of lauryl methacrylate and diethylaminoethyl methacrylate 50:50 by weight, and quaternary ammonium salts of the last-said copolymer, (2) at least 2% by weight, based on the weight of said film-forming material, of a cationic surface active agent.

5. An improved hair-setting composition comprising a lower alcoholic solution containing from 3 to 6% by weight of a film-forming copolymer of vinyl pyrrolidone with vinyl acetate, from 15:85 to 60:40 by weight, and from 2% to 100% by weight, based on the weight of said copolymer, of a cationic surface active agent.

6. A hair-setting composition as defined in claim 5 in which said copolymer contains 40% vinyl pyrrolidone and 60% vinyl acetate.

7. A package comprising a pressure-tight container having a valve-controlled outlet and containing a pressure propellant and an improved hair-setting composition comprising a homogeneous solution in a lower alcohol, said solution containing (1) from 3 to 6% by weight of a film-forming material selected from the class consisting of a copolymer of vinyl acetate and vinyl pyrrolidone from 40:60 to 85:15 by weight, a copolymer of vinyl pyrrolidone and vinyl stearate from 80:20 to 40:60 by weight, a copolymer of vinyl propionate and vinyl pyrrolidone 50:50 by weight, a copolymer of methyl acrylate and vinyl pyrrolidone 65:35 by weight, a copolymer of lauryl methacrylate and diethylaminoethyl methacrylate 50:50 by weight, and quaternary ammonium salts of the last-said copolymer, (2) at least 2% by weight, based on the weight of said film-forming material, of a cationic surface active agent.

8. A package comprising a pressure-tight container having a valve-controlled outlet and containing an improved hair-setting composition comprising a homogeneous solution in a lower alcohol, which solution contains (1) a volatile propellant in a liquid phase (2) from 3 to 6% by weight, based on the weight of said alcohol, of a film-forming material selected from the class consisting of a copolymer of vinyl acetate and vinyl pyrrolidone from 40:60 to 85:15 by weight, a copolymer of vinyl pyrrolidone and vinyl stearate from 80:20 to 40:60 by weight, a copolymer of vinyl propionate and vinyl pyrrolidone 50:50 by weight, a copolymer of methyl acrylate and vinyl pyrrolidone 65:35 by weight, a copolymer of lauryl methacrylate and diethylaminoethyl methacrylate 50:50 by weight, and quaternary ammonium salts of the last-said copolymer, (2) at least 2% by weight, based on the weight of said film-forming material, of a cationic surface active agent.

9. A package comprising a pressure-tight container having a valve-controlled outlet and containing an improved hair-setting composition comprising a homogeneous solution in a lower alcohol which solution contains a volatile propellant in liquid phase, from 3 to 6% by weight of a film-forming copolymer of vinyl pyrrolidone with vinyl acetate from 15:85 to 60:40 by weight, and from 2% to 100% by weight, based on the weight of said copolymer, of a quaternary cationic surface active agent.

10. A package as defined in claim 9 in which said copolymer contains 40% vinyl pyrrolidone and 60% vinyl acetate.

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