METHOD OF TREATING HAIR

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1. This invention relates to the treatment of hair on the head of a human for the purposes of straightening kinky hair, curling kinky hair after it has been straightened out, or for curling hair generally, whether kinky or straight, without harm to the hair or irritation to the user or operator.

More particularly, this invention relates to a hair-treating composition and to the method for applying the composition in the treatment of human hair, and it comprises a continuation in part of my copending application, Serial No. 112,186, filed on August 24, 1949, and now abandoned.

One of the present methods for treating hair permanently to modify its arrangement on the human head embodies the use of substances which render the hair soft and plastic by reduction reaction to rupture of the disulfide linkages in the keratin molecule which constitutes one of the fibrous proteins of which the hair is formed. While the hair is in this plastic condition, it may be formed to desired configuration, such as into curls, by winding about a curling spool or the like. Rupture of the disulfide linkages of the cystine molecule of the keratin is secured by a reduction reaction such as with thioglycollic acid, and, after the hair has been shaped to the desired position, the disulfide bond must be re-formed by oxidation as by the application of peroxide or other oxidizing substances. Suitable reducing agents include also caustic alkalies, salts of thioglycollic acid, and various sulfides.

Considerable difficulty has been experienced in the use of these compositions because these substances which are used to rupture the disulfide bond and render the hair plastic also constitute suitable depilatories, the only difference between hair removal and hair softening residing in a small difference in the pH of the treating composition. Whether or not the composition operates in a manner of a depilatory or as a hair-waving composition also depends upon the individual characteristics of the hair and the environment in which it is used. As a result, these cold-wave compositions have been found to be relatively dangerous in many instances, especially when applied by an inexperienced operator. Furthermore, in order to accomplish the desired results, especially when used for removing kinks from hair, hours of treatment are required, and even then the end result is often insufficient.

There are a number of other techniques which have been used in the past for hair-forming but, in many respects, these are even more objectionable than the cold-wave technique heretofore described. For example, resin compositions containing phenol formaldehyde resin and the like have been applied to the hair for reaction of the phenol formaldehyde to an advanced stage of polymeric growth whereby the formed resinous material is intended to hold the hair in position of setting. Reaction of phenol with formaldehyde in the presence of the hair filaments has been found to cause a combined reaction in which the hair itself forms an ingredient and is reacted to a composition which is different than normal hair. In addition, the phenolic material has been found to cause skin irritation and the reaction product resulting from such treatment acquires a yellow discoloration which is highly objectionable.

An older process which includes combing the hair with pressing oils instead of a composition containing phenol formaldehyde resin is unsuitable because it does not effect the desired results in a permanent manner. In fact, the effect from combing the hair with pressing oils is apparently lost immediately when the hair becomes moistened or wetted, and the effect thereof is lost very quickly even in the absence of moisture.

In accordance with the practice of this invention, the desired effect in permanent hair arrangement is secured quickly, safely, and easily by the treatment of the hair on the human head with a composition containing an organo-silicon polymer (polysiloxane) adapted to be set in contact with the surface of the hair as by elimination of diluent when the organo-silicon polymer is in an advanced stage of polymeric growth so as to be a solid under room conditions, or by reaction of the organo-silicon polymer when applied in an intermediate stage of polymeric growth to an advanced stage of polymeric growth in the presence of a catalyst or in the presence of heat to form a hardened and set organo-silicon polymer. Although hair-setting may be achieved by the use of the organo-silicon polymer alone, it is preferred to make use of the polymer in combination with an organo-silicon fluid in the form of a lubricant and softening agent.

The organo-silicon compounds applied and reacted on the hair in this manner are not harmful to the hair or to the scalp with which such organo-silicon compounds might come in contact. The organo-silicon compounds, which are known for water-repellency, are able to impart these properties to the hair strands with the result that
they are relatively unaffected by moisture after setting. Thus the treatment with compositions of this invention wherein hot combs or other heat-generating means are used to achieve the desired conditions for the hair, and, at the same time, responsive to suitable treatment, the hair is given a permanent set in any desired position.

Suitable organo-silicon compounds are selected from substances having the general formula:

\[ R \end{align*}  
\begin{align*} \text{R} & \quad \text{R} \\
\text{Si-O} & \quad \text{Si-O} \\
\text{R} & \quad \text{R} \]

wherein \( R \) generally is formed of a monovalent organic radical usually connected directly to the silicon atom through a contained carbon atom, and when the organic group of the \( R \) radical is of sufficient length or molecular weight to resist hydrolysis, the \( R \) group may be connected through an oxygen atom and be in the form of a non-hydrolysable oxo group. \( R \) is usually methyl, ethyl, propyl, phenyl, or benzyl, but it may also constitute any one of a large number of aliphatic, aromatic, mixed aliphatic-aromatic, or heterocyclic groups, such as methyl, ethyl, propyl, isopropyl, butyl, amyl, hexyl, cetyl to octadecyl, and higher, cyclopentyl, cyclohexyl, phenyl, tolyl, xyl, mesityl, monomethyl phenyl, diethyl phenyl, naphthyl, methyl naphthyl, benzyl, phenyl ethyl, furfuryl, and the like. When aliphatic or mixed aliphatic-aromatic, the aliphatic group may be branched or straight-chained, it may be substituted or unsubstituted, and it may be saturated or unsaturated, such as in allyl, methallyl, vinyl, or acryl groups.

If the original silane of which the organo-silicon polymer is formed contains more than two hydrolyzable groups such as described in Patent No. 2,308,672, a cross-linked polymer may be produced which when carried to the full extent of polymeric growth as by catalytic reaction or heat or combinations thereof, a product is secured which is infusible and insoluble under conditions of use.

Depending upon the molecular weight, as defined by the number of building units defined as \( n \) groups in the above general formula, the organo-silicon compound may range from a fluid of low viscosity, representative of a chain with a few silicon-oxygen silicon linkages or thousands of these building units present in a molecule to form a solid, such as a wax, elastomer, or resin. Eventually, each organo-silicon molecule is terminated with what is referred to as a blocking unit that corresponds to one of the \( R \) groups and, when properly blocked, the molecule becomes a useful product.

In accordance with the practice of this invention wherein hot combs or other heat-generating means are used to achieve setting, the organo-silicon polymer is selected of a heat-hardenable or thermosetting compound in an intermediate stage of polymerization. The organo-silicon fluid or lubricant is selected of a stable, low molecular weight compound having relatively few building units between end-blocking groups. It may be more expedient to define the suitable organo-silicon fluids or lubricants according to their viscosity by which they are presently identified on a commercial scale. These range from a viscosity of about 20 to 15,000 centipoises measured at a temperature of about 25°C. Suitable materials within this range have a boiling point of 52°C at 760 mm. mercury to 2.5°C at 15 mm. mercury. Other than the length of the molecular chain, viscosity differences may depend upon the type of \( R \) group attached to the silicon atom. For example, the viscosity range may be varied by differences in the chain length of dimethyl polysiloxane or diethyl polysiloxane, or variation in viscosity may be achieved by polymerization to form dimethyl polysiloxane (DC 200 fluid), diethyl polysiloxane (DC 400 fluid), diphenyl polysiloxane (DC 500 fluid), lauryl methyl polysiloxane (DC 1200 fluid), or decyl polysiloxane (DC 1500 fluid). It is, of course, to make use of an organo-silicon fluid or lubricant having a viscosity of about 1–500 centistokes at 25°C. Further examples of fluids of the type described which may be used in the practice of this invention are set forth in Patents Nos. 2,394,934 and 2,377,689. Use may also be made of silanes having an organic group of long chain length such as dodecyl trichloro silane, or octadecyl trichloro silane and the like.

An organo-silicon resin-forming material suitable for use in the practice of this invention which makes use of heat to advance the organo-silicon polymer from an intermediate stage of polymeric growth is best defined by its characteristics which permit its use without injury to the hair. More specifically, it is desirable to employ an organo-silicon resin-forming material convertible from an intermediate stage of polymeric growth to an advanced or set stage by reaction at a temperature below 500°F. and preferably at a temperature between 300°–450°F. At these temperatures, it is possible to keep the polymerization reaction to the desirable condition in 1–5 minutes, although as much as 20 minutes may be used. Resinous material which may be used in an intermediate stage of polymeric growth for further polymerization in situ on the hair or in a full stage of polymeric growth for setting by elimination of solvent are the organo-silicon polymers prepared in accordance with the United States Patents Nos. 2,258,221, 2,371,068, 2,389,477, 2,392,716, 2,371,690, 2,413,695, 2,375,993, and British Patent No. 549,658.

In the absence of heat, the same type of organo-silicon compound may be applied in an intermediate stage of polymeric growth but, instead of relying on thermal treatment to react the resin-forming material to an advanced stage of polymeric growth, the dried polymer may be secured by the presence of catalysts which cause the reaction to take place under conditions of use or at slightly elevated temperatures. The catalyst may be incorporated directly into the hair-treating composition in the event that reaction depends upon the elimination of solvent or oxidation and stability to union exposure under conditions after application onto the hair, or, it may be incorporated into the treating composition immediately before application to the hair.
in the event that reaction starts substantially immediately upon addition. Condensation catalysts may be used if added just prior to application by spraying or precipitating onto the hair. Representative are ethyl borate, ethylene diamine, triethanolamine and the like.

When reliance is had upon evaporation of solvent or other diluent to set the organo-silicon compound on the hair, use is made of an organo-silicon compound characterized by a large number of building units as previously described so as to be substantially solid at room temperature.

Suitable organo-silicon resins and resin-forming materials include the copolymers of phenyl methyl, phenyl and methyl polysiloxane, dimethyl, phenyl and methyl polysiloxanes, diphenyl methyl polysiloxane, methyl and phenyl polysiloxane, and other condensation reaction products of hydrolyzed silanes, components of which have two or more hydrolyzable groups to permit a certain amount of cross-linking in resin formation.

These materials are preferably applied to the hair in dilute concentrations such as in solution with suitable solvents or in dispersions or emulsions with certain solvent or aqueous systems, alone or in combination. Suitable solvents for the organo-silicon compounds include toluene, xylene, benzene, coal tar naphtha, petroleum naphtha, chlorinated hydrocarbons such as carbon tetrachloride, ethylene dichloride and the like, alcohols such as ethanol, butanol, isopropyl alcohol, amyl alcohol and suitable non-toxic ethers and esters, such as Cellosolve and the like. Preferred solvents should meet the qualifications of evaporation in from 0.1–5 minutes at a temperature of treatment, yet they should exhibit low vapor pressure or slow evaporation at room temperature to permit more uniform distribution before the solvents have been removed. The solvent system should have a flash point of sufficiently high temperature to minimize a fire hazard and components of the system should exhibit no toxicity to prevent a health hazard by inhalation of vapors or skin irritation. Best use is made of glycol ethers and glycol esters such as ethylene glycol monoethyl ether and ethylene glycol monoethyl ether acetate.

It is preferred to apply the treating composition by spraying from an atomizing into the particular area of hair being worked. Instead, the entire head may be wet with the composition since the diluent is of the type which does not evaporate before uniform distribution is secured. Application may also be made by a dabber or applicator on sections of the hair or the entire head may be wet by dipping into a bath of the treating composition or by flowing the substance over the desired area.

The amount of organo-silicon resin-forming material in the treating composition is preferably maintained within the range of 1–3 percent by weight, otherwise the shaft of the hair will be increased in its apparent diameter to a degree wherein the hair would become unmanageable. If more than 5 percent resinous material is used, an undesirable matted or bonded result will result with most hairs and the hair would become stiffened to a point where breakage would be possible. Some hair will tolerate more but amounts in excess of 10 percent by weight have not been practical. When used in amounts within the range described, the hair shaft can be properly guided to the desired set in a simple and expedient manner.

Best use is made of the organo-silicon fluid or lubricant in amounts ranging from 0.05–3 percent by weight. Since the fluid tends to plastise the resin and impart softness to the hair, the amount used should depend upon the type of hair and in proportion to the amount of organo-silicon resin or resin-forming material in the treating composition.

It is important to have a uniform distribution of the applied organo-silicon materials throughout the lengths of the hair fibers in order to avoid excessive concentration in certain areas which might lead to undesirable stiffening or matting. Most hair naturally requires a film of oil on the outer walls thereof and rapid wetting out with the treating composition in order to achieve uniform distribution has been found to be difficult very often in the absence of a small amount of suitable wetting agents incorporated onto the hair fibers before addition of the organo-silicon treating composition, or else incorporated directly into the treating composition. As a result of this, it is desirable to select a compound that is stable, which has little if any color, and which is compatible with the system in which organo-silicon compounds are formulated. Use may be made of aryl alkyl polyether alcohols, such as are marketed by Rohm and Haas under the trade name X-100, such as are marketed by Atlas Powder Company under the trade name Tween, or sorbitan monolaureate, monopalmitate, or monostearate, polyoxyethylene derivatives. Instead, other commercially available materials such as polyglycol esters, diethylene ester of sodium sulfosuccinate, aryl alkyl polyethylene sulfonate, sorbitan, sulfoulate, fatty alcohol sulfates, aromatic polyglycol ethers, polyoxyethylene ethers, sodium di(2-ethyl-hexyl) phosphate, alkyaryl sulfonates, and the like. The amount of wetting agent may range from 0.05–2% by weight of the treating composition. Although more can be used, the amount specified is sufficient.

Description will now be made of the practice of this invention with the use of hot combs or other heating means to set the organo-silicon resin-forming material. In practice, it is best to shampoo the hair thoroughly to remove any dirt, grease, oil, or the like. After drying, the treating composition containing the organo-silicon compound in combination with a wetting agent in suitable solvents or in aqueous dispersion is applied lightly to secure a homogeneous coverage on all sections of the hair, as by means of an atomizing spray, cotton swab, or distribution may be achieved by pouring the composition onto certain areas and working into the hair with the finger tips. The area of the hair which has been wetted with the treating composition is then straightened by use of a metallic comb heated to a temperature which exceeds 300° F. but is preferably maintained at a temperature within the range of 300–500° F. The hair is pressed with the heated comb until all foaming caused by the rapid evaporation of diluent ceases and until any solvent odor has substantially completely disappeared. This usually requires about 2 to 4 minutes, during which time the comb is continuously passed slowly through the hair, about 10 to 20 strokes. At this time, the resinous material has become suitably advanced and the hair is thereafter held in permanent fashion in a combed position.

Kinky hair which has been straightened by
this new technique can be permanently waved simply by wrapping a shock of the straightened hair about curlers and then hewing in the usual manner employed for permanent waving for a short length of time without requiring application of additional treating composition. Hair which is naturally straight can be permanently waved by wrapping shocks of hair about curlers in the normal permanent-wave technique, applying the organo-silicon containing treating composition herein described, and then heating for the usual length of time for driving off the solvent and advancing the resinous material. The time required by this process corresponds favorably with that generally employed in present permanent-wave systems. By the use of the technique described and claimed herein, it is not necessary to wash out any of the organo-silicon ingredients because they are non-injurious to hair or scalp, and they tend in combination to impart a sheen or silky softness to the hair and improve the appearance and feel thereof. This technique has a number of advantages over present systems in that the hair will not become discolored nor are the hair molecules tampered in any way by reducing and oxidizing agents necessary for present cold waves.

The following examples are given by way of illustration, but not by way of limitation, to demonstrate compositions which may be used in the practice of this invention for securing hair straightening by the use of heat.

**Example I**

1 to less than 5 percent by weight of a polysiloxane resin curing at a temperature above 275° F.  
0.5 to 2 percent by weight of a lubricant  
0.05 to 1 percent by weight wetting agent  
0 to 0.4 percent perfume oils  
98.85 to 99.16 percent by weight diluent

**Example II**  
1-3 percent by weight polysiloxane resin (phenyl ethyl, phenyl and ethyl polysiloxane)  
0.5-2 percent by weight polysiloxane fluid (dimethyl polysiloxane)  
0.1-0.5 percent by weight wetting agent  
0-0.4 percent by weight perfume oil  
remainder solvent

**Example III**  
1.5 percent by weight polysiloxane resin (dimethyl phenyl and methyl polysiloxane curing at 350° F.)  
0.5 percent by weight polysiloxane fluid (diphenyl polysiloxane—DC 500 fluid)  
0.1 percent by weight aryl alkyl polyethyl alcohol wetting agent  
0.2 percent by weight perfume oil  
25 percent by weight cellosolve  
15 percent by weight xylol  
57.7 percent by weight kerosene (odorless)

**Example IV**  
4.5 percent by weight polysiloxane resin (phenyl and ethyl polysiloxane)  
1.5 percent by weight polysiloxane fluid (dimethyl polysiloxane—500 centistokes viscosity at 25° C.)  
0.2 percent sorbitan monolaurate polyoxyethyl ene derivative wetting agent  
0.3 percent by weight perfume oil  
25 percent by weight xylol  
20 percent by weight cellosolve  
48.5 percent by weight Solvesso No. 2

**Example V**  
2.6 percent by weight polysiloxane resin (phenyl ethyl, phenyl and ethyl polysiloxane)  
0.2 percent by weight wetting agent  
0.2 percent by weight perfume oil  
97 percent by weight ethylene glycol monoethyl ether solvent

**Example VI**  
2.5 percent by weight dimethyl polysiloxane resin—curing at 300° F.  
0.15 percent by weight dimethyl polysiloxane fluid (1 centistoke viscosity at 25° C.)  
40 percent by weight cellosolve  
57.5 percent by weight xylol

The composition of Examples I to V exclusive is sprayed onto a small section of cleaned and dried kinky hair by means of an atomizer. The wetted hair is pressed with a heated metallic comb regulated to about 400° F. by passing the comb through the hair slowly under pressure until foaming ceases and the odor of solvent has disappeared. This usually requires about 10 to 20 strokes taken over a period of about 5 minutes, but the time and number of strokes can be varied according to the operator. The object is to press the kinky hair until it is straight, lustrous, and silky and the polysiloxane resin advanced to a stage sufficient to hold the hair in its straightened form. The same steps are repeated on adjacent sections of hair until the entire head of hair has been treated. The hair may now be finger-waved or pin-curl the hair in the cold, curled with a heated curling iron, permanently waved with a permanent-wave machine, or else styled as desired without the application of additional treating composition. The hair may be shampooed and waved a number of times without causing the hair to revert to its original state.

In the use of the composition of Example VI, the cleansed hair is preferably treated with a wetting agent of the type dioctyl ether of sodium sulfonate in dilute solution of about 0.1 percent by weight to prepare hair fibers for rapid wetting out with the organo-silicon treating composition. Thereafter the process for treating the hair may be carried out as previously described in connection with Examples I to V.

In the event that it is desired to achieve hair-setting without the use of hot combs, compositions of the type set forth in Examples I to VI may be employed with the modification of adding catalytic agents in small amounts thereof so as to advance the resin-forming material to a set stage in situ upon the hair fibers without the use of hot combs or other heating means to effect the polymerization reaction. For example, the formulations of Examples I to VI may embody triethanolamine in amounts ranging from 0.1-0.5 percent by weight. Compositions of the type set forth in Examples I to VI may also have incorporated therein just prior to application onto the hair in the manner previously described dehydrated catalysts of the type ethyl borate, ethylene diamine, triethanolamine, or the like in amounts ranging from 0.1-1 percent by weight. When such catalytic agents are used in combination with organo silicones in formulations of the type described, it has been found that the reaction takes place more slowly than when heated temperatures are used, but it is seldom necessary to use heat at temperatures in excess of 250° F. to secure the desired rapid setting reaction.

The following examples illustrate the use of
organo-silicon resin materials which become set on the hair fibers upon evaporation of diluent.

Example VII
0.2 percent sorbitan monolaurate polyoxyethylene derivative
0.3 percent by weight perfume oil
68.5 percent by weight low-boiling petroleum solvent
25 percent by weight benzene

Example VIII
4 percent by weight phenyl ethyl polysiloxane resin in a full stage of polymeric growth
1.0 percent by weight octadecl trichloro silicone
0.7 percent by weight perfume oil
0.7 percent by weight Stoddard solvent
25 percent by weight toluene

Example IX
5 percent by weight polysiloxane resin (British Patent No. 542,685)
2.0 percent by weight lubricant (U. S. Patent No. 2,377,869)
0.3 percent by weight aryl alkyl polyethyl alcohol wetting agent
0.2 percent by weight perfume oil
0.2 percent by weight dispersing agent
25.3 percent by weight water

Compositions of Examples VII and VIII are prepared as a solvent solution and the composition of Example IX is prepared as an aqueous dispersion.

The compositions may be lightly applied onto sections of the hair as by spraying or by swabbing with a cotton pad, and the hair combed or otherwise held in position which it is desired to have the hair set until the water or the solvent has been substantially completely eliminated by evaporation. Elimination of the solvent may be carried out under room conditions, but it may be accelerated by the use of elevated temperatures such as temperatures of about 100°–150° F. Higher temperatures may be used so long as the temperature does not exceed that at which the hair will be harmed.

Hair treated in the manner described may be further formed as by the finger-waving methods, curling irons, or permanent-wave machines in the manner previously suggested for the hot-comb compositions. If desired, oleaginous substances such as oils, waxes, and the like may be incorporated in the treating composition or applied to the hair afterwards further to improve the sheen and the softness of the hair.

It will be understood that the composition set forth herein for treating hair on the human head constitutes subject matter of this invention as well as the method for using same and that changes may be made in the materials, their ratio and concentration in the treating composition, within the limitations described and that further changes may be made in the manner of applying the composition on the hair, without departing from the spirit of the invention, especially as defined in the following claims.

I claim:
1. The method of setting the hair on the human head comprising the steps of treating the hair with a thermosetting organo-silicon polymer reacted to an intermediate stage of polymeric growth and an organo-silicon fluid, and then heating the treated hair to advance the polymer while the hair is being positioned in the arrangement in which it is to be set.
2. The method of setting the hair on the human head comprising the steps of wetting the hair with a thermosetting organo-silicon resin reactive at a temperature of 300° F. to polymerize to an advanced stage of polymeric growth and an organo-silicon fluid, and then heating the wetted hair to a temperature of 300–500° F. to advance the resin while the hair is being positioned in the arrangement in which it is desired to be set.
3. The method of setting the hair on the human head comprising the steps of treating the hair with a thermosetting organo-silicon resin which is polymerizable to an advanced stage of polymeric growth at a temperature above 300° F. and an organo-silicon fluid having a viscosity between 1–500 centistokes at 25° C., and then applying heat to the treated hair in the range of 300–500° F. to advance the resin while the hair is being positioned in the arrangement in which it is to be set.
4. The method for setting the hair on the human head comprising the steps of treating the hair with a liquid composition containing 1–10 percent by weight of an organo-silicon thermosetting resin reacted to an intermediate stage of polymeric growth and up to 3 percent by weight of an organo-silicon fluid, and applying heat to the wetted hair to remove any diluent and react the resin in situ on the hair to an advanced stage of polymeric growth while the hair is being positioned in the arrangement in which it is to be set.
5. The method of setting the hair on the human head comprising the steps of treating the hair with a solution containing 1–10 percent by weight of an organo-silicon resin forming material reactive at a temperature starting with 300° F. and up to 3 percent by weight of an organo-silicon fluid, and applying heat of 300–500° F. to the treated hair to drive off the solvent and react the resin in situ on the hair surfaces while the hair is being positioned in the arrangement in which it is to be set.
6. The method of straightening the hair on the human head comprising the steps of treating the hair with an organo-silicon resin reacted to an intermediate stage of polymeric growth and an organo-silicon fluid diluted to form a treating composition in which the materials are present in the ratio of 1–10 percent by weight resin and up to 3.0 percent organo-silicon fluid and combing sections of the treated hair with a comb heated to a temperature in the range of 300–500° F. until the diluent is removed and frothing ceases.
7. The method of giving a permanent wave comprising the steps of treating the hair with an organo-silicon compound reacted to an intermediate stage of polymeric growth and an organo-silicon fluid diluted to form a treating composition in which the organo-silicon materials are present in the ratio of 1–10 percent by weight organo-silicon resin and up to 3.0 percent by weight organo-silicon fluid, combing sections of the hair with a heated comb to drive off the diluent and advance the resinous material, arranging the straightened hair into curls, and applying further heat to set the hair in the curly arrangement.
8. The method of setting hair in a desired arrangement comprising the steps of treating the hair with an organo-silicon resin reacted to an intermediate stage of polymeric growth and a lubricant diluted together to form a treating composition containing 1–10 percent by weight of the organo-silicon resin and up to 3 percent by weight of the lubricant, applying heat to portions of the treated hair to remove the diluent and react the resin in situ on the hair surfaces while positioning the hair in the arrangement in which it is to be set.

9. The method of setting hair comprising the steps of treating the hair with an organo-silicon thermosetting resin reacted to an intermediate stage of polymeric growth in 1–3 percent concentration in diluent, and then applying heat to the treated hair to remove the diluent and react the resin in situ to an advanced stage of polymeric growth while positioning the hair in the arrangement in which it is to be set.

10. The method of setting the hair on the human head comprising the steps of treating the hair with a composition containing an organo-silicon fluid in combination with an organo-silicon polymer in concentrations ranging from 1–10 percent by weight in the treating composition, setting the polymer in situ on the hair strands, and positioning the hair in the arrangement in which it is desired while setting the organo-silicon polymer.

11. The method of setting the hair on the human head comprising the steps of treating the hair with a composition containing an organo-silicon fluid in combination with an organo-silicon polymer in an intermediate stage of polymeric growth, reacting the polymer in situ on the hair strands to polymerize the organo-silicon resin forming material to an advanced stage of polymeric growth and positioning the hair in the arrangement in which it is to be set while advancing the organo-silicon resins material.

12. The method of setting the hair on the human head comprising the steps of treating the hair with an organo-silicon fluid and an organo-silicon polymer in an intermediate stage of polymeric growth and present in concentrations of 1–10 percent by weight in a diluent, evaporating the diluent to set the organo-silicon materials on the hair strands and positioning the hair to the arrangement in which it is desired to be set during evaporation of the diluent.

13. The method of setting the hair on the human head comprising the steps of treating the hair with a solution containing an organo-silicon fluid and an organo-silicon polymer in a hardened and advanced stage of polymeric growth, evaporating the diluent to set the organo-silicon resin about the hair fibers, and positioning the hair in the arrangement in which it is to be set while evaporating the diluent.

14. The method of setting the hair on the human head comprising the steps of treating the hair with a composition containing up to 3 percent by weight of an organo-silicon fluid and from 1–10 percent by weight of an organo-silicon resin forming material in an intermediate stage of polymeric growth, advancing the resin forming material to a hardened stage in situ on the hair strands, and positioning the hair in the arrangement in which it is to be set while advancing the organo-silicon resins material.

15. The method of setting the hair on the human head comprising the steps of treating the hair with a composition containing up to 3 percent by weight of an organo-silicon fluid, from 1–5 percent by weight of an organo-silicon resin in an intermediate stage of polymeric growth and a catalyst for advancing the resin to a set stage in situ on the hair fibers, and positioning the hair in the arrangement in which it is to be set during such advancement reactions.

16. The method of setting the hair on the human head comprising the steps of treating the hair with a solution containing up to 3 percent by weight of an organo-silicon fluid and from 1–5 percent by weight of an organo-silicon resin in an advanced stage of polymeric growth, evaporating the diluent to set the organo-silicon materials on the hair strands, and positioning the hair in the arrangement in which it is to be set during evaporation of the diluent.

17. The method of setting hair comprising the steps of wetting the hair with an organo-silicon resin reacted to an advanced stage of polymeric growth and present in concentrations of 1–10 percent by weight in a diluent, evaporating the diluent to set the organo-silicon materials on the hair strands and positioning the hair to the arrangement in which it is desired to be set during evaporation of the diluent.

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No references cited.