

HAIR RINSE CONDITIONERS WITH SUPERIOR DRY HAIR
FEEL AND HIGH HAIR LUSTRE

- The present invention relates to novel hair rinse conditioning compositions, which may be clear or opaque, capable of providing superior dry feel and high lustre properties to hair treated therewith, comprising
5. a ternary mixture of polyvinyl pyrrolidone/vinyl acetate (PVP/VA) copolymer, at least one hydrophilic cationic quaternary ammonium compound and a water-soluble nonionic cellulose polymer in an aqueous vehicle. The use of this ternary mixture is essential
 10. in order to obtain the superior dry feel and high lustre hair properties. Also, this mixture is readily and completely removable from the hair by simply shampooing; and does not cause an undesirable build-up of conditioner on the hair.
 15. Conventional rinse conditioners comprise cationic-fatty alcohol emulsion systems which tend to oil and grease the hair. The cationic quaternary compounds may have a hydrophobic group or groups such as lauryl, cetyl, stearyl or benzyl attached to the nitrogen atom
 20. or may have a less hydrophobic group such as a polyoxypropylene amido alkyl radical of 3 to 60 propylene oxide groups attached to the nitrogen atom as shown in US 3,155,591. These hair substantive cationics are used to emulsify oils or fatty substances
 25. such as fatty alcohols, amides or glycols to enhance the wet and dry combing properties of the cationic. Unfortunately, they provide conditioning of an oily or fatty nature that leaves a dulling effect on the hair.
- The prior art also discloses other hair
- 30.

- conditioning compositions containing conventional hydrophobic quaternary ammonium compounds containing a higher alkyl or alkenyl group of more than eight carbon atoms, usually 16 - 18 carbon atoms, together with
5. resins such as PVP/VA copolymers in hair setting compositions. More specifically, US Patent No. 3,144,391 shows hair setting compositions containing water soluble copolymers of vinyl pyrrolidone with vinyl esters of fatty acids such as a copolymer of
 10. vinyl acetate and vinyl pyrrolidone (40:60 to 85:15) and a minor proportion of a cationic surfactant containing a hydrocarbon radical of at least 8 carbon atoms and ethyl alcohol. US Patent No. 3,694,141 too, discloses a method of hair conditioning by applying an
 15. aqueous setting solution comprising a disulfide compound containing a nitrogen atom, a PVP/VA copolymer and a minor proportion of a quaternary ammonium compound such as trimethyl cetyl ammonium bromide (column 6, lines 15-30). Similarly, US Patent No.
 20. 4,348,383 discloses hair setting lacquers or lotions comprising dithioether compounds for reducing the oily appearance of the hair in combination with a cosmetic resin such as PVP/VA copolymers (column 3, lines 53-54) and quaternary ammonium compounds (column 4, lines 7
 25. and 52-54) in an aqueous, alcoholic, or hydro-alcoholic solution. However, this group of patents relates primarily to hair setting solutions containing the PVP/VA copolymer as the film-forming agent, not to hair rinse conditioners which give the hair superior dry
 30. feel and high lustre properties.

The prior art also discloses water-soluble quaternary ammonium compounds as a skin substantive emollient in cosmetic products, e.g. hair styling gels

shown in US Patent Nos. 3,766,267 and 3,355,290 which further include a carboxylated vinyl polymer. On the other hand, said water-soluble quaternary ammonium compounds have been used as a conditioning agent in hair rinses containing a lubricant such as a higher fatty alcohol as shown in US Patent No. 3,155,591. But, no PVP/VA copolymer or other quaternary compound is disclosed in this group of compositions.

5. US Patent Nos. 4,220,168 and 4,374,125 disclose, respectively, a moisture control hair spray composition containing PVP/VA copolymers as an optional ingredient and a moisture stabilising conditioner containing a quaternary ammonium salt conditioner as an optional ingredient.

10. However, none of the foregoing patents discloses a hair conditioning composition having dry feel and high hair lustre properties comprising the ternary mixture of a PVP/VA copolymer, one or more hydrophilic cationic quaternary ammonium compounds and a water soluble nonionic cellulose polymer in an aqueous medium wherein said quaternary compound is present in the proportion to the PVP/VA copolymer prescribed hereinafter.

15. It has been found that a hair rinse conditioning composition comprising a ternary mixture of a PVP/VA copolymer, a hydrophilic quaternary ammonium compound(s) which is free of alkyl or alkenyl radicals containing more than eight carbon atoms in the molecule and a water soluble nonionic cellulose polymer in an aqueous medium provides a stable composition which imparts superior dry feel and hair lustre properties as well as very good body and dry hair manageability to hair treated therewith.

20. The present invention aims to provide a hair rinse conditioner which imparts superior dry feel and high

lustre properties to the hair comprising a ternary mixture of PVP/VA copolymer, at least one hydrophilic quaternary compound having water-solubility which are free of hydrophobic alkyl or alkenyl radicals of more than eight carbon atoms in the molecule and a water soluble nonionic cellulose polymer in an aqueous medium.

The present invention also aims to provide a hair rinse conditioner which provides good body and dry hair manageability to the hair treated with said conditioner. This invention further aims to provide an aqueous hair rinse conditioner having a minimal build-up effects on the rinse conditioner which is readily removable from the hair by simply shampooing.

According to the present invention a hair rinse conditioning composition comprises a ternary mixture of a polyvinyl pyrrolidone/vinyl acetate (PVP/VA) copolymer, at least one hydrophilic cationic quaternary compound which is free of alkyl or alkenyl radicals containing more than eight carbon atoms in the molecule and a water-soluble nonionic cellulose polymer in an aqueous medium. The aqueous medium preferably constitutes about 71% to 99.3%, or more preferably 80% to 98.3%, most preferably 90% to 97.7% by weight of the composition.

More specifically, the present invention relates to a hair conditioning composition which provides the hair treated therewith with a superior dry feel and high lustre properties, containing as the essential conditioning agents, a ternary mixture of about 0.5-15.0 by weight of a PVP/VA copolymer, about 0.1%-10% by

- weight of at least one cationic quaternary compound with a hydrophilic group attached to the nitrogen atom, and about 0.1-4% by weight of a water soluble nonionic cellulose polymer in 71-99.3% by weight of an aqueous vehicle.

The performance criteria of a good hair conditioning rinse is: disperses well throughout the hair upon application; provides good ease of wet combing, i.e., detangles the hair without damaging it; 10. provides good ease of dry combing with good hair manageability; and maintains good hair shine without an oily feel. Typically, clean hair is shiny and hair treated with rinse conditioners is usually dull in appearance.

15. It has been found that more desirable rinse conditioners can be made by using polyvinylpyrrolidone/vinyl acetate (PVP/VA) copolymers in place of the fatty materials conventionally used. Such conditioners impart a dry feel, good body and 20. improved shine properties to the hair. Further, it has been found that superior dry feel/high hair lustre rinse conditioners can be made by employing such polyvinylpyrrolidone/vinyl acetate copolymers in combination with a quaternary ammonium compound which 25. has hydrophilic properties, i.e., a compound which is wholly or partly soluble in water and does not contain a hydrophobic alkyl or alkenyl radical of more than eight carbon atoms in the molecule. This improved rinse conditioner imparts good wet combing, superior 30. hair lustre, good body and very good dry hair manageability to hair treated therewith. It has also been found that the addition of more hydrophilic cationic compound enhances the hair shine properties of

PVP/VA copolymer rinse conditioners even when a usual hydrophobic type cationic compound such as stearyl dimethyl benzyl ammonium chloride or di-hydrogenated tallow dimethyl ammonium chloride is present, too.

5. Furthermore, the presence of a water soluble nonionic cellulose polymer further enhances the conditioning properties of the hair rinse-conditioner. It is believed that the coaction of this ternary mixture of ingredients is responsible for the superior and
10. unexpected conditioning effects, including the substantial absence of conditioner build-up on the hair. The three essential ingredients are completely compatible.

- The PVP/VA copolymer, which is one of the
15. essential components of the present invention, is a substantially water insoluble film forming material which has been used in the prior art in hair sprays, liquid or foam hair setting compositions and the like. Suitable PVP/VA copolymers are obtainable from the GAF
 20. Corporation in the form of a 50% A.I. (active ingredient) clear liquid solution in either ethanol or isopropanol at room temperature, with the weight ratio of PVP/VA varying from 70:30 to 30:70. For example, PVP/VA E-735 is a 50% (AI) solution in ethanol of
 25. PVP/VA/ in the weight ratio of 70:30; PVP/VA E-335 is a 50% (AI) solution in ethanol of PVP/VA in the weight ratio of 30:70 and PVP/VA I-735 is a 50% (AI) solution in isopropanol of PVP/VA in the weight ratio of 70:30. The alcohol solutions of the PVP/VA copolymers exhibit
 30. water tolerance, thereby enabling their use in aqueous systems such as aqueous conditioning compositions. For example, the water tolerance of PVP/VA copolymers of the E-Series, expressed in parts of water added to 100

parts of a 25% copolymer solution in anhydrous ethanol until the appearance of a slight haze, is as follows:

	<u>Polymer</u>	<u>Water Tolerance</u>
5.	PVP/VA E-735	540 parts water
	PVP/VA E-535	175 parts water
	PVP/VA E-335	120 parts water

10. In use, a clear film of PVP/PA copolymer is deposited on the hair treated with compositions containing such polymers to provide hair with a high lustre. The PVP/VA copolymer is preferably used in amounts of about 0.5% to 15%, more preferably 0.9% to 10% and most preferably 1.35% to 3% by weight of the composition.

15. Another essential ingredient in the hair rinse composition according to the present invention is a cationic quaternary ammonium compound, which exhibits at least partial solubility in water. Such compounds do not contain a hydrophobic alkyl or alkenyl group of ~~at least~~ ^{more than} eight carbon atoms in their molecular

20. structure like the traditional conditioning quaternary ammonium compounds such as cetyl or stearyl dimethylbenzyl ammonium chloride, but preferably contain a polyoxyalkylene radical of at least nine carbon atoms in their molecular structure. Because of

25. this difference, these compounds exhibit solubility in water varying from complete water solubility for compounds containing a relatively low number of C₃-C₄ alkylene oxide groups e.g. eight propylene oxide groups, to partial solubility in water for compounds

30. containing a higher number of said alkylene oxide groups, e.g. twenty-five or forty-one propylene oxide groups. These ingredients exhibit cationic functionality in both oil and water, with the

- lipophilic tendency being proportional to the amount of polyether structure comprising the individual compound's molecular weight. A high order of antistatic efficiency is due to the combined effects of their cationic activity and the hydroscopicity of their polyether structures.

Suitable compounds generally correspond to the following formula:



- wherein R and R¹ each represent an alkyl radical containing 1 - 3, preferably 1 - 2, carbon atoms; R² represents either [CH₂CH(R₄)O]_nH or alkylene O [CH₂CH(R⁴)O]_nH where R⁴ represents an alkyl radical of 1 - 2 carbon atoms, preferably methyl, n is 3 to 60, preferably 9 to 41, and alkylene contains not more than three carbon atoms; X is a lower alkyl or alkenyl radical containing 1 to 4 carbon atoms or is an alkaryl radical containing from 7 to 9 carbon atoms; and A is an anion selected from the group consisting of chlorine, bromine, hydroxy, sulphate, metho- or ethosulphate, nitrate, phosphate, acetate, formate and sulphonate, preferably chlorine or bromine. Particularly preferred compounds are methyl, diethyl, polyoxypropylene (8 - 41) quaternary ammonium chlorides. These preferred compounds may be purchased from Witco Chemical Company under the trade names Emcol (Registered Trade Mark) CC9 (quaternium 6) containing 9 moles of propylene oxide; Emcol CC-36 (quaternium 20) containing about 25 moles of propylene oxide; and Excol CC-42 (quaternium 21) containing 41 moles of propylene

oxide.

The method of making these quaternary ammonium compounds is described in US Patent Nos. 3,141,905, 3,155,591 and 3,123,641 and the disclosures of these patents are hereby incorporated by reference in this specification.

Because of the substantivity to the hair of the foregoing quaternary ammonium compounds, the said compounds appear to coact with the PVP/VA film forming ingredients to yield treated hair with an adherent lustrous film that can be readily removed by washing with shampoo. In addition, these ingredients are essentially non-irritating and are compatible with anionic and nonionic surfactants as well as with phenolic germicides. The cationic polyoxyalkylene quaternary ammonium compounds preferably constitute about 0.1% to 10%, more preferably 0.45% to 8%, most preferably 1.35% to 3%, by weight of the hair conditioning composition. Furthermore, the weight ratio of these cationic polyoxyalkylene quaternary ammonium compounds to the PVP/VA polymer ingredient should preferably be controlled in the range of 1:5 to 20:1, more preferably from 1:3 to 2:1.

The third essential ingredient in the hair conditioning compositions is a water-soluble, nonionic, cellulose polymer which functions both as a thickening agent and as a conditioning agent. Suitable cellulosic polymers are preferably selected from the group consisting of hydroxyethyl cellulose and hydroxypropylmethyl cellulose, with hydroxyethyl cellulose being preferred. Hydroxyethyl cellulose is the product of reaction between an alkali cellulose and ethylene oxide, and such products are available in a number of

- viscosity grades. Viscosity is primarily dependent upon the viscosity of the cellulose used in the reaction. The degree of substitution of hydroxyethyl groups per glucose unit is 1.4 - 1.5 and these hydroxyethyl celluloses have an average molecular weight range from about 80,000 to about 900,000. A particularly preferred hydroxyethyl cellulose is available under the trade name Natrosol (Registered Trade Mark) 250 HR from Hercules, Inc.. Water soluble hydroxypropyl methyl cellulose has a methoxyl content between about 25% and about 32% by weight and a hydroxypropyl content between about 2% and 10%, preferably 2% to 7%, by weight. Again, the chain length of the cellulose used in the reaction can be controlled to provide a molecular weight which yields a viscosity for a 2% solution in water in the range of 10 cps and 5000 cps, preferably 50 cps to 4000 cps.

- These cellulose polymers provide stability to the composition upon ageing by viscosity control. The composition retains its viscosity without thinning out or thickening. In addition to controlling the viscosity of the aqueous hair rinse, the cellulose polymer contributes to its conditioning properties. It appears that hydrogen bonding occurs between the water soluble nonionic cellulose polymer and the cationic quaternary compound, resulting in additional conditioning benefits to the hair rinse. This unexpected dual function and coaction with the other two essential conditioning ingredients provides a uniquely superior hair rinse product. The cellulose polymer content preferably constitutes about 0.1-4%, more preferably 0.2% to 2%, most preferably 0.25% to 1.2%, by weight of the conditioning hair rinse composition.

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The final essential ingredient in the conditioning hair rinse compositions is an aqueous medium which is primarily water. Since the PVP/VA polymer is usually

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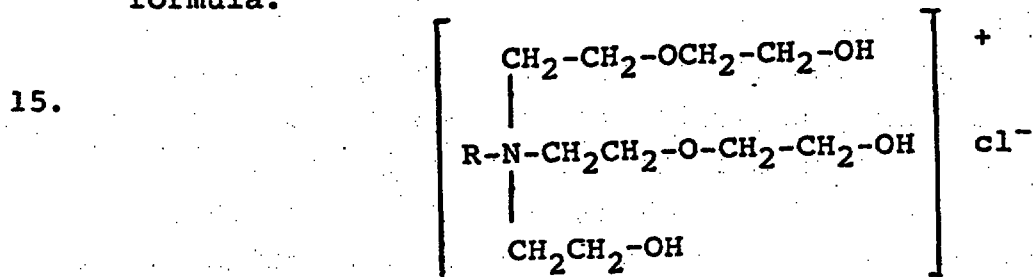
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- supplied as a solution in ethanol or isopropanol, the aqueous medium usually contains a minor amount of a C₂-C₃ alkanol. Furthermore, if desired, additional amounts of C₂-C₃ alkanol may be added to the composition, particularly where the composition is sold in the form of a "mousse." The proportion of the aqueous medium is preferably in the range of 71% to 99.3%, more preferably 80% to 98.3%, most preferably 90% to 97.7%, by weight of the hair rinse composition.
10. Usually, the C₂-C₃ alkanol will be a minor proportion of the aqueous medium, ranging from 2% to 25% by weight of the hair rinse composition, with the higher amounts of such alkanol being present in the "mousse" compositions.
15. An optionally desirable component in hair conditioning compositions of the present invention is a foaming cationic surfactant which functions as a dispersant and contributes to the conditioning properties of the final product. This cationic surfactant is a hydroxylated quaternary ammonium compound containing polyethoxy radicals, a gluconamidopropyl radical, or a hydroxylated gluconamido C₁-C₃ alkyl radical attached to the nitrogen atom, at a concentration of 0.1% to 8%, preferably 0.5% to 4%, by weight.
20. A typical hydroxylated cationic quaternary ammonium compound containing a gluconamidopropyl radical is Quaternium 22 (γ-gluconamidopropyl dimethyl 2-hydroxyethyl ammonium chloride). Quaternium 22 is a water-soluble gluconamidopropyl quaternary salt
25. which can be obtained from the Van Dyke Company under the trade name Ceraphyl 60 in the form of a clear yellow to light amber liquid containing 58%-62% by weight of said salt in water, having a pH of 4-5 and a specific
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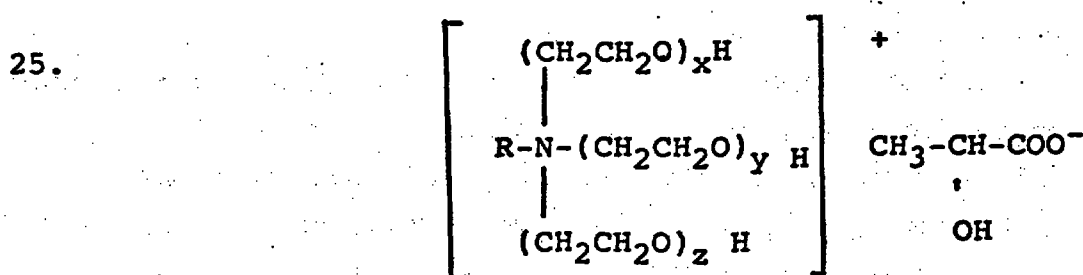
gravity at 25°C of 1.17-1.21. The method of preparing this compound is fully described in US Patent No. 3,766,267, the subject matter thereof being incorporated by reference herein.

5. A typical hydroxylated quaternary compound containing polyethoxy radicals is Quaternium 36 (stearyl pentaethoxy ammonium chloride) which may be obtained from the Hoechst Company under the trade name Genamin (Registered Trade Mark) KS-5 in the form of a clear yellow liquid containing 20%-22% by weight of said quaternary salt in water. The pH of Genamin KS-5 is 6.5 ± 0.5 . Quaternium 36 has the following chemical formula:



20. wherein R is primarily C_{18} .

Another hydroxylated quaternary ammonium compound containing polyethoxy radicals is alkylpolyethoxy ammonium lactate having the following formula:



30. wherein R is primarily C_{18} and the sum of $x+y+z$ is approximately 5. This alkyl pentaethoxy ammonium lactate also is obtainable from the Hoechst Company as

a clear liquid in the form of a water/ethylene glycol solution containing 30% of the said quaternary compound under the trade name of Genamin (Registered Trade Mark) KSL.

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The hair conditioning compositions in accordance with this invention may be in the form of a clear or opaque pourable liquid, gel or liquid under pressure for use either as a hair rinse after shampooing or as a hair conditioning-styling mousse. The viscosity of the

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final product may range from at least 50 centipoises to up to 20,000 centipoises and such product may be in the form of a liquid, preferably having a viscosity of 500 to 8000 centipoise measured at 77°F (25°C) a viscous lotion or a cream. The hair conditioning product in

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the form of a gel may be packaged in and extruded from a squeeze tube or any suitable container by applying pressure. Thus, the product may be in the form of a liquid under pressure packaged in an aerosol container containing propellant, for example from 3 to 20% e.g. 5 - 20% by weight of a C₃-C₄ hydrocarbon propellant, a package that is particularly useful for hair styling mousses. In lieu of the aerosol container, the conditioning product also may be packaged in a squeeze spray container.

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The pH of the hair conditioner of present invention is acidic and ranges from about 3-6, preferably about 4-5.

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The hair conditioning compositions of this invention also may contain conventional additional components such as colouring agents, perfumes, preservatives such as formaldehyde (formalin), brighteners such as Uvinul, cationic hydrophobic quaternary ammonium compounds, and other polymers such

as copolymers of polydimethyl-siloxane and a polyoxyalkylene ether. The total weight of these optional additives usually does not exceed 5% by weight of the composition and preferably does not exceed 2% by weight of the composition.

5. The present hair conditioning compositions are readily made by mixing the ingredients preferably in the manner prescribed hereinafter. For example, a preferred method of preparing the present compositions
10. comprises the steps of forming a thick uniform dispersion of hydroxyethyl cellulose by mixing the hydroxyethyl cellulose in cold water, heating the dispersion to about 60°C until thick and thereafter cooling to 49°C; sequentially admixing the quaternary ammonium compounds(s) (Quaternium 21, Quaternium 22 and Quaternium 36) and the PVP/VA copolymer with said dispersion; cooling the mixture to 38°C; adding thereto
15. colorant, perfume, formalin and other optional additives with agitation; and cooling the resultant mixture to room temperature (24°C) thereby forming an opaque or clear product. Instead of sequentially adding the cationic quaternary compound(s) and the PVP/VA copolymer, said compounds may be premixed and added as a premix to the thick aqueous hydroxyethyl
20. cellulose dispersion.
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- These hair conditioner products have unexpected superior properties due to the coaction of the specific ternary combination of PVP/VA copolymer, the cationic quaternary compound having a polyoxyalkylene group
30. attached to the nitrogen atom and the nonionic water soluble cellulose polymer. The novel hair conditioner compositions provide a dry feel, very good body and superior high lustre properties to the hair treated

therewith and eliminate the dulling of clean hair resulting from the use of conventional hair conditioners. In addition, the inventive conditioners exhibit complete wash-off with shampoos, whereas conventional conditioning hair rinses or hair mousses

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- are retained, thereby resulting in an undesirable build-up of conditioner on the hair. Consequently, continual usage of the conventional hair conditioners dulls the hair. Present products have eliminated this problem. Additional conditioning benefits imparted to the hair include very good wet and dry combing, very good manageability and good antistatic properties.

- The invention may be put into practice in various ways and a number of specific embodiments will be described to illustrate the invention with reference to the accompanying examples. All amounts of various ingredients in the examples, as well as elsewhere in the specification are by weight unless otherwise specified.

15.

Example 1

An opaque rinse conditioner having the formulation given in Table 1 is made up.

Table 1

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<u>Ingredient</u>	<u>% by wt.</u>
Water	87.3
Hydroxyethyl cellulose ¹	1.2
Quaternium 21 ²	4.5
25. Quaternium 22 ³	1.5
PVP/VA (70/30) copolymer ⁴	2.5
Ethanol	2.5
D C Yellow 10 (1%)	0.2
Perfume	0.2
30. Formalin	0.1
	100.0

Notes on Table 1

¹Purchased from Hercules Inc. under the name Natrosol (Registered Trade Mark) 250 HR

5. ²Polyoxypropylene (40) methyl diethyl ammonium chloride (98% AI) and water (2%) purchased from Witco Chemical Corporation as Emcol (Registered Trade Mark) CC-42.

10. ³Gluconamidopropyl, dimethyl, 2-hydroxyethyl ammonium chloride (58-62% AI) and 38-42% water purchased from Van Dyk and Company as Ceraphyl 60

15. ⁴Polyvinylpyrrolidone/vinyl acetate copolymer 70/30 purchased from GAF Corporation under the name PVP/VA E-735 as a 50% by weight solution of polymer in ethanol.

20. The hydroxethyl cellulose is dispersed in cold water with mixing and the mixture is heated to 60°C-66°C until thick and uniform and thereafter cooled to 49°C. Quaternium 21, Quaternium 22 and PVP/VA E-735 are sequentially added to the cellulose dispersion with agitation and mixed until homogeneous. The mixture is cooled to 38°C and the colour, perfume and formalin are admixed therewith. The product becomes opaque upon cooling to 24°C to 29°C.

25. When applied to the hair, this product distributes well throughout the hair and rinses out well. Wet and dry combining are very good and the hair maintains good shine even after 1hr. of blowdrying. Manageability is very good and the hair feels dry, has good body and no static.

30. This product aged satisfactorily for 13 weeks under accelerated aging conditions at temperatures of

-18°C, 4°C, 25°C, 38°C and 49°C.

- Unlike current (prior art) rinse conditioners containing C₁₂-C₁₈ mono-alkyl and dialkyl quaternary ammonium salts that build up on the hair with multiple shampoo-rinse conditioner treatments, this product washes out of the hair with shampooing which is a desirable attribute. In addition, it appears from the practical use testing that the degree of conditioning can be controlled with this product by varying the rinsing time. Short rinse periods provide maximum conditioning, and long rinse periods provide less conditioning effects. For maximum conditioning properties this product can be applied directly to the hair without rinsing. Such use suggests that this conditioner has application as a hair mousse.

Example 2

A rinse conditioner having the formulation given in Table 2 is made up.

20.	<u>Table 2</u>	<u>% by wt.</u>
<u>Ingredient</u>		
Water		84.2
25. Hydroxyethyl cellulose ¹		1.0
Quaternium 21		3.5
Ethanol		7.0
PVP/VA (50/50) copolymer ⁵		3.0
Perfume		0.2
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Copolymer of polydimethyl siloxane and polyoxyalkyne ether 6	1.0
Formalin	0.1

5.	100.0
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Notes on Table 2

⁵Polyvinylpyrrolidone/vinyl acetate copolymer (50/50) purchased from GAF corporation under the name PVP/VA E-535 as a 50% weight solution of polymer in ethanol

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⁶Purchased from General Electric Company under the name Silicone SF 1188.

15. This product is prepared according to the method of Example 1.

When applied to the hair after shampooing, this formula provides good wet and dry combing properties and a very good shine to the hair.

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Example 3

A rinse conditioner having the formulation given in Table 3 is made up.

Table 3

<u>Ingredient</u>	<u>% by wt.</u>
25. Water	81.2
Hydroxyethyl cellulose ¹	1.0
Quaternium 21	3.5
Quaternium 36 ⁷	4.0
PVP/VA copolymer (30/70) ⁸	3.0
30. Ethanol	7.0
Perfume	0.2
Formalin	0.1

	100.0

Notes on Table 3

⁷Stearyl hydroxyethyl di-2-ethoxyethanol ammonium chloride purchased from American Hoechst as 21% dispersion of quaternary salt in water

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⁸Polyvinylpyrrolidone/vinyl acetate copolymer (30/70) purchased from GAF Corporation under the name PVP/VA E-335 50% by weight solution of polymer in ethanol

10. This product is prepared according to the method of Example 1.

Quaternium 36 is used as a dispersant. Similarly good hair conditioning results are obtained when this product is applied to the hair.

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Examples 4 - 7

Compositions having the formulations given in Table 4 are made up.

Table 4

20. <u>Ingredient</u>	<u>EX 4</u>	<u>EX 5</u>	<u>EX 6</u>	<u>EX 7</u>
	% by wt.	% by wt.	% by wt.	% by wt.
Water	82.7	82.7	82.7	82.7
Quaternium 6 ⁹	6.0	6.0	-	-
25. Quaternium 21 ²	-	-	6.0	6.0
PVP/VA copolymer (50/50) ⁵	3.0	-	3.0	-
PVP/VA copolymer (30/70) ⁸	-	3.0	-	3.0
30. Ethanol	7.0	7.0	7.0	7.0
Hydroxyethyl cellulose ¹	1.0	1.0	1.0	1.0

Perfume	0.2	0.2	0.2	0.2
Formalin	0.1	0.1	0.1	0.1
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	100.0	100.0	100.0	100.0

5. Notes on Table 4

⁹Polyoxypropylene (9) methyldiethyl ammonium chloride (98%) and water (2%) purchased from Witco Chemical Corporation as Emcol CC-9.

10. All of the foregoing products when applied to the hair as rinse conditioners after shampooing provide very good conditioning properties such as slip (spreadability), shine and wet and dry combing properties. The compositions of Examples 6 and 7 which contain the quaternary having the longer propoxylated chain impart superior slip, wet and dry combing, shine and antistatic properties to the hair. Also, all of the compositions are stable when aged at 25°C.

20.

Example 8

A hair conditioning mousse having the formulation given in Table 5 is made up.

Table 5

<u>Ingredient</u>	<u>% by wt.</u>
25. Water	81.23
Hydroxyethyl cellulose ¹	0.27
Quaternium 21	0.9
Quaternium 22 ³	1.1
PVP/VA (70/30) copolymer ⁴	0.9
30. Ethanol	5.4
Perfume	0.2

Propellent Blend	10.0
80% isobutane	
20% propane	-----
	100.0

5.

With the exception of the propellent ingredient, the foregoing composition is prepared in accordance with the procedure of Example 1. The resultant mixture in the form of milky solution is filled into an aerosol container and the said container is closed with a valve of the type used in aerosol shaving cream. Thereafter, the valved container is pressurized by adding the compounds thereto. When the valve is activated by the consumer, a quick breaking foam mousse of the low foam type is expelled which provides excellent conditioning effects when distributed throughout the consumer's hair.

Example 9

20. A hair conditioning mousse having the formulation given in Table 6 is made up.

Table 6

<u>Ingredient</u>	<u>% by wt.</u>
Water	68.53
25. Hydroxyethyl cellulose ¹	0.27
Quaternium 21	0.9
PVP/VA (70/30) copolymer	0.9
Cocoamidopropyl dimethyl betaine	0.3
Ethanol	18.9
30. Perfume	0.2

Propellent Blend	10.0
80% isobutane	
20% propane	

5.

100.0

- This product is prepared and filled into a valved container in accordance with the procedure of Example 8. When sprayed from the container, this product
10. exhibited a delayed breaking foam - a fairly stable, stiff foam - which provided good hair conditioning effects when distributed throughout the hair.

Example 10

15. A hair conditioning mousse having the formulation given in Table 7 is made up.

Table 7

<u>Ingredient</u>	<u>% by wt.</u>
Water	67.58
20. Hydroxyethyl cellulose ¹	0.27
Quaternium 21	0.45
Stearyl hydroxyethyl, di-2-ethoxyethanol ammonium lactate	0.8
PVP/VA (70/30) copolymer	1.35
25. Ethanol	19.35
Perfume	0.20
Propellant Blend	10.0
80% isobutane	
20% propane	
30.	----- 100.0

This product is prepared and filled into a valved container in accordance with the procedure of Example 8.

5. This hair mousse product foamed well upon discharge from the container - exhibiting a stiff foam - and applied easily to dry hair tress.

10. The following Tress Tests were performed on the products of Examples 8, 9 and 10, and compared to Alberto (Registered Trade Mark) Mousse presently on the market, in Table 8 below. All products are applied to dry hair tresses and the tresses are evaluated for the characteristics listed in Table 8.

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TABLE 8

	<u>Characteristic</u>	<u>Ex. 8</u>	<u>Ex. 9</u>
	Nature of application	slippery - easy on application	slippery - easy on application
5.	Ease of wet combing (after application)	excellent	excellent
	Hair stiffness (hold)	moderate	light
	Degree of shine	high	moderate
10.	Neatness after comb-out	excellent	very good
	<u>Characteristic</u>	<u>Ex. 10</u>	<u>Alberto</u> <u>(Registered</u> <u>Trademark)</u> <u>Mousse</u>
15.	Nature of application	slippery - easy on application	not too slippery - more difficult to spread throughout hair
20.	Ease of wet combing (after application)	excellent	fair
25.	Hair stiffness (hold)	heavy	heavy
	Degree of shine	excellent (high)	high
30.	Neatness after comb-out	excellent	good

- Mousse products of Examples 8 and 9 have light to moderate hold properties as compared to the commercial control product. However, compositions 8 and 9 provide better ease of application, easier comb-out and better overall appearance than the control mousse. Slightly less shine properties were found with Example 9 which was probably caused by the presence of the betaine used to produce better foam properties. The product of Example 10 had the best overall conditioning properties including the best foaming and discharge properties.

- In Examples 8-10, a C_3 - C_4 hydrocarbon propellant is present as an essential ingredient in proportions of 3% to 20%, preferably 5% to 15%, by weight of the ultimate mousse composition. In the mousse products, the inclusion of the propellant typically reduces the proportion of the other essential ingredients on a pro rata basis because the normal procedure is to admix 80 to 97 parts by weight of the conditioning composition with 3 to 20 parts by weight of propellant in an aerosol container.

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CLAIMS

1. A hair rinse conditioning composition capable of providing superior dry feel and high lustre properties comprising a ternary mixture of polyvinylpyrrolidone/vinyl acetate copolymer; at least one hydrophilic cationic quaternary compound which is free of alkyl or alkenyl radicals containing more than eight carbon atoms in the molecule and water soluble nonionic cellulose polymer in an aqueous medium.
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10. 2. A hair rinse conditioning composition capable of providing superior dry feel and high lustre properties comprising, by weight, a ternary mixture of 0.5% to 15% of a polyvinylpyrrolidone/vinyl acetate copolymer; 0.1% to 10% of at least one hydrophilic cationic quaternary compound which is free of alkyl or alkenyl radicals containing more than eight carbon atoms in the molecule; and 0.1% to 4% of a water-soluble nonionic cellulose polymer in 71% to 99.3% of an aqueous medium.
- 15.
20. 3. A hair rinse conditioning composition capable of providing superior dry feel and high lustre properties comprising, by weight, a ternary mixture of 0.5% to 15% of a polyvinylpyrrolidone/vinyl acetate copolymer; 0.1% to 10% of at least one hydrophilic cationic quaternary salt which is free of alkyl or alkenyl radicals containing more than eight carbon atoms in the molecule, the weight ratio of said quaternary compound to said copolymer being in the range of 1:5 to 20:1, and 0.1% to 4% of a water-soluble nonionic cellulose polymer in 71% to 99.3% of an aqueous medium,
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said composition having a pH in the range of 3 to 6.

4. A hair rinse composition as claimed in any one of Claims 1 to 3, in which the weight ratio of polyvinylpyrrolidone to vinyl acetate, in the
5. copolymer is within the range of 70:30 to 30:70.

5. A hair rinse composition as claimed in any one of Claims 1 to 4, in which the hydrophilic quaternary compound has a polyoxyalkylene radical
10. containing from 3 to 60 $C_3 - C_4$ alkylene oxide groups attached to the nitrogen atom.

6. A hair rinse composition as claimed in Claim
15. 5 in which the polyoxyalkylene radical is a polyoxypropylene radical.

7. A hair rinse composition as claimed in Claim
20. 6 in which the hydrophilic cationic quaternary compound is polyoxypropylene (40) quaternary ammonium chloride.

8. A hair rinse composition as claimed in any one of Claims 1 to 7, in which the water-soluble nonionic cellulose polymer is hydroxyethyl cellulose.
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9. A hair rinse composition as claimed in any one of Claims 1 to 8 which contains, in addition, from 0.1% to 8% by weight of a hydroxylated quaternary ammonium compound containing polyethoxy radicals, a
30. gluconamidopropyl radical or a hydroxylated gluconamido- $C_1 - C_3$ alkyl radical attached to the nitrogen atom.



10. A hair rinse composition as claimed in any one of Claims 1 to 9 in which the said copolymer is present in an amount of 0.9% to 10%, the said hydrophilic quaternary compound is present in an amount of 0.45% to 8% by weight, the weight ratio of the said quaternary compound to the said copolymer is 1:3 to 2:1, the said nonionic cellulose polymer is present in an amount of 0.2% to 2% by weight and the said aqueous medium is present in an amount of 80% to 98.3% by weight.

11. A hair rinse composition as claimed in any one of Claims 1 to 10 in which the said hydrophilic quaternary compound is polyoxpropylene (40) methyldiethyl ammonium chloride, the said copolymer is polyvinylpyrrolidone/vinyl acetate in a 50:50 weight ratio and the said cellulose is hydroxyethyl cellulose.

12. A hair rinse composition as claimed in any one of Claims 1 to 11 which is in the form of a pourable opaque or clear liquid having a minimum viscosity of 500 centipoises and a maximum viscosity of about 8000 centipoises measured at 77°F (25°C).

13. An opaque hair rinse composition according to Claim 11 comprising a mixture of polyoxypropylene (40) methyldiethyl ammonium chloride, a polyvinylpyrrolidone/vinyl acetate copolymer in the ratio of 70:30 by weight and hydroxyethyl cellulose, in said aqueous medium.



14. A hair rinse composition as claimed in Claim 13 which contains, in addition, 0.1% to 8% by weight of gluconamidopropyl dimethyl-2-hydroxyethyl ammonium chloride.
5. 15. A hair rinse composition as claimed in any one of Claims 1 to 11 which is in the form of a mousse and contains, in addition, from 3% to 20% by weight of a C₃-C₄ hydrocarbon propellant.
10. 16. A hair rinse composition as claimed in Claim 15 in which the said propellant is present in an amount of 5% to 20% by weight.
15. 17. A hair rinse composition as claimed in Claim 1 substantially as specifically described herein with reference to the accompanying examples.
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