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(54) Title: PUMPABLE PREPARATION FOR SHAPING HAIR

(57) Abstract: Pumpable hair shaping preparation containing an Acrylates Copolymer as a setting polymer for shaping and fixing hair in one step, wherein no or ≤ 0.1 % by weight ethanol is contained.



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Pumpable preparation for shaping hair

The present invention describes a cosmetic product in the form of a hair shaping preparation, which is provided as a pump spray being completely or substantially ethanol-free. The use of this preparation allows the shaping of the hair; the hair shaped in this way has a long-term hold, i.e. the hair shaping preparation according to the invention provides a long-lasting hold of the hair style.

Hair is an important part of the human body. It is present on almost all parts of the human body, except from the lips, the palms and the soles of the feet, however on most parts of the human body the hair is hardly visible. Because of the many nerve endings on the hair root, hair reacts sensitive to external influences such as wind or touch and therefore hair should not be an underestimated part of the sense of touch. However, today the most important function of human head hair is to influence the appearance of a human being in a characteristic way. Similar to the skin, hair fulfills a social function, because it significantly contributes to the self-esteem of an individual by its appearance.

Hair consists of the hair shaft and the hair root. The hair root, which sticks in the skin, is the living part of the hair. The hair shaft protrudes freely from the skin, and is a keratinized (dead) section of the hair. Hair shafts represent the actual visible part of the hair, being continually renewed. The hair shaft consists of three parts: the medulla, the cortex, and the cuticle. The central part, the medulla, which is also called hair marrow, is regressed in humans, often completely missing. The medulla is surrounded by the cortex being a fiber layer. This layer consists of dead horny fiber cells and determines the strength and elasticity of the hair. In this layer color pigments are also contained. The cuticle is very thin and transparent.

Assumed that there are no pathological changes, human hair in its freshly grown condition is virtually impossible to improve. The part of the hair in the vicinity of the scalp accordingly has a virtually closed horny layer. In particular, the horny layer, being the external sheath of the hair, and also the inner region below the cuticle are subjected to particular stress by environmental influences.

Frequently, natural hair has little volume of its own and long hair often hangs limp and straight down from the head. However, many people want their hair having more volume and be shaped (styled) in a pleasing way. This can basically be achieved in two ways, on the one hand there are methods for permanently shaping hair, for example, the perm and on the other hand non-permanent procedures that form and fix the of the hair only for a limited time.

To achieve a non-permanent hairstyle, several product forms are provided that may be used individually or in combination with one another. Examples include, for instance, setting solutions, mousses, hair sprays, hair waxes, hair gels and others more. Different product forms are available, those, which are preferably applied to the wet hair and others, which are applied to dry hair. For example, product forms intended for hair application include setting solutions and mousse. During the subsequent drying process, the hair is brought into the desired shape, for example by curlers, brushes, straighteners and other means.

Another way to get the hair shaped is to use product forms that are applied to dry hair. Known products are hair gels, hair waxes and gel sprays, the latter being often used in Asia. After application of the above mentioned products, the dry hair is styled in the desired way, for example, by the hands, brushes or otherwise.

Hairspray products contain a fixing agent, usually a fixing polymer, which must be solubilized. In general, said hair spray products contain a high amount of alcohol, especially ethanol. This has two advantages, on the one hand, the solubility of the fixing polymers in alcohol is very high, especially in ethanol, and on the other hand, the alcohol, especially ethanol, evaporates quickly after the spraying process, thus quickly forming a fixing film on the hair. Hair sprays, both in the form of aerosol sprays and in the form of pump sprays are thus applied to the already shaped and styled hair and mainly serve to fix the already styled hair.

Therefore, "classic" hair spray products are characterized by the fact that propellants are contained. Propellants usually comprise or consist of gases, which are known to contribute to the greenhouse effect. For this reason, it is desirable to avoid the use of this kind of propellants.

However, "classic" hairspray products have further disadvantages; many consumers complain that frequent use of hair spray products containing high amounts of alcohol, especially ethanol, result in dry hair. Likewise, the skin of the scalp can get dryer. Irritation, itching, and burning of the scalp and a reddened skin of the scalp may be the consequence.

Hence, there was a need to provide a hairstyling preparation, which contains little or no alcohol, in particular ethanol, and may be distributed without any propellant.

In prior art documents have already been published disclosing hair fixative formulations in the form of pump sprays.

DE 29707765 U1 describes a hair styling composition in the form of a pump spray. Various example formulations for pump sprays are disclosed, which describe the incorporation of a nonionic polymer, an amphoteric polymer or no polymer at all. There is also a disclosure of anionic polymers, but these polymers are not in accordance with the invention.

DE 102008013171 A1 discloses hair fixative preparations, which may optionally be in form of a pump spray. The invention according to DE 102008013171 A1 was aimed at improving the volume of the hair, for which purpose a special polymer 1 obtainable from vinylpyrrolidone, tert-butyl acrylate, methacrylic acid, dimethylaminopropylmethacrylamide and methacryloyloxyethyl dimethylethyl ammonium ethylsulfate, was incorporated into the preparations. The use of Acrylates Copolymer in the hair setting preparations is also described, but only together with the specific polymer 1.

WO 2010/000361 A1 discloses volume-increasing hair fixative preparations, which may optionally be in form of a pump spray. The disclosed example formulations describe the use of a Polymer 1, available from vinylpyrrolidone, tert-butyl acrylate, methacrylic acid, dimethylaminopropylmethacrylamide and methacryloyloxyethyl dimethylethyl ammonium ethylsulfate, and another nonionic polymer.

EP 1319389 B1 discloses hair fixative preparations, which may optionally be in form of a pump spray containing a terpolymer obtainable from vinylpyrrolidone, dimethylaminopropylmethacrylamide and quaternized alkyldimethylaminopropylmethacrylamide and another anionic and/or amphoteric polymer.

EP 0937450 B1 discloses a styling agent provided as a pump spray, which may contain various types of fixing polymers. Example formulations for non-aerosol pump hair sprays are disclosed, which describe the use of an amphoteric and in a second example a nonionic polymer. All these preparations contain large amounts of ethanol.

US 7029661 B1 describes hair fixative preparations which may be applied to the hair as pump sprays. In addition to example preparations, which contain relatively large amounts of ethanol, example preparations without ethanol are also disclosed. All preparations disclose the use of two different polymers.

There is still a need to improve or simplify the hair styling products.

Moreover, it is desirable to have a product, which allows to combine the step of shaping, modelling and/or styling the hair with the step of fixing the hair style in only one step. In particular, it is desirable to provide product forms enabling hair shaping and fixing by only one preparation.

Furthermore, it is advantageous, if the shaping preparation does not have to be applied by hands, as is the case with hair gels and hair waxes. When using the aforesaid product forms, the hands come into contact with the respective preparation, the hands will then be sticky and/or greasy and product residues stay on the hands. Consumers do not like that.

Hence, there was a need to provide a hair shaping and fixing preparation that allows both processes in one step, namely shaping and fixing, counteracts the hair and the scalp becoming dry, and can also be applied in a simple, economical and even way on the hair.

The above objects are achieved by a pumpable preparation for hair shaping containing

- a setting polymer selected from Acrylates Copolymers, in particular dispersible in an emulsion,
- one or more emulsifier(s),
- one or more preservative(s),
- $\geq 50\%$ by weight of water, in relation to the total weight of the preparation, and
- $\leq 0.1\%$ by weight of ethanol, in particular 0% by weight or 0.0001 to 0.01% by weight, in relation to the total weight of the preparation,

wherein the hair shaping preparation is contained as a pump spray in a container, wherein the container is equipped with a spray pump.

The hair shaping preparation is a cosmetic preparation that is advantageously applied to the scalp hair.

The water content of the hair shaping preparation of the present invention is 50% by weight or more; it is preferred, if 80% by weight or more of water is contained in the hair shaping preparation of the present invention, it is more preferable, if the water content is in the range of 85 to 95% by weight, all in relation to the total weight of the hair shaping preparation. It is even more preferred, if the water content is in the range from 89 to 92% by weight, in relation to the total weight of the hair shaping preparation.

The setting polymer is selected from the Acrylates Copolymers. Acrylates Copolymers are characterized in that the synthesis is carried out from monomers comprising acrylic acid,

methacrylic acid and branched and/or unbranched C1 to C4 esters of acrylic acid and/or methacrylic acid. For example, the properties of the particular Acrylates Copolymers may be influenced by the ratio of the anionic monomers (for example acrylic acid and methacrylic acid) to the nonionic monomers (branched and / or unbranched C1 to C4 esters of acrylic acid and/or methacrylic acid), the degree of crosslinking and the particular conditions during synthesis.

The Acrylates Copolymer may be characterized by a specific charge density. According to the invention it is preferred, if the anionic charge density of the Acrylates Copolymer is 1 to 2 meq/g, in particular 1.3 to 1.8 meq/g. The charge density may be determined with the following method:

Apparatus and Reagents:

Analytical Balance (± 0.001 g)

Erlenmeyer Flasks – 250 ml

Burette – 50 ml (0.1 ml gradation)

Sodium Hydroxide, Aqueous solution, 0.100 N, Standardized

Phenolphthalein Indicator (1% in anhydrous ethanol, SDA-40-2 quality).

Procedure:

- 1) Weigh 0.8 – 1.0 g (determine weight to 0.001 g) of the respective polymer into a 250 ml wide-mouth Erlenmeyer Flask.
- 2) Add 50 ml of anhydrous ethanol, SDA-40-2 quality, and swirl gently until solution is completed. The flask should be stoppered to minimize the evaporation of solvent.
- 3) Add 3 drops of Phenolphthalein Indicator solution and titrate with standardized 0.100 N NaOH to the first persistent (30 seconds) pink end-point.
- 4) Determine the Free-Acidity of the respective polymer in duplicate.
- 5) Determine a blank titration on 50 ml of anhydrous ethanol, SDA-40-2 quality.

Calculation:

The Free-Acidity of the respective polymer is expressed as milli equivalents/gram (meq/g)

$$\text{Meq/g} = \frac{(B-A) N}{W}$$

A = ml NaOH required for blank,

B = ml NaOH required for the respective polymer sample,

W = weight of the respective polymer in g,

N = normality of NaOH solution.

As can be seen from the information on the charge density, the Acrylates Copolymer of the present invention is an acidic polymer. In order that the necessary properties of the polymer, namely the fixing properties, come into effect, it is necessary to neutralize the polymer. Advantageously, 2-amino-2-methyl-1-propanol (AMP), 2-amino-2-methyl-1,3-propanediol (AMPD), mono-isopropanolamine, triisopropanolamine, and inorganic bases, such as sodium hydroxide and potassium hydroxide may be used as neutralizing agents. In particular, 2-amino-2-methyl-1-propanol (AMP) is preferred. A degree of neutralization of 95 to 110% of the Acrylates Copolymer is advantageous. To approximately determine how much of the neutralizing agent is required to achieve the desired degree of neutralization, the following formula may be used:

$$Y = \frac{W \times A \times N \times E \times S}{1000}$$

W = Part by weight (g) of the respective polymer,

A = Acidity (meq/g) of the respective polymer,

N = % neutralization required (decimal),

E = Equivalent weight of base used,

S = percentage solids (expressed as a decimal) of the respective polymer,

Y = Parts by weight (g) of base required.

Moreover, it is advantageous, if the Acrylates Copolymer is dispersible in an emulsion. The dispersibility in an emulsion enables a simple form of incorporation of said polymer into an

aqueous preparation, especially into the hair shaping preparation. Thus, it is advantageous, if the Acrylates Copolymer is provided as a raw material, which is in the form of an emulsion, in which the Acrylates Copolymer is contained. It is preferred, if an anionic surfactant is contained in said raw material emulsion.

According to the present invention it is advantageous, if an Acrylates Copolymer is contained, which for example is obtainable from AkzoNobel under the trade name BALANCE® CR Polymer.

In the preparation according to the present invention the setting polymer selected from Acrylates Copolymers is contained in an amount of 1.0 to 6.0% by weight, preferably 3.5 to 5.9% by weight, more preferably 5.0 to 5.9 % by weight, in relation to the total weight of the preparation and in relation to the active content of the Acrylates Copolymer.

Alcohols are derivatives of unsubstituted, aliphatic or alicyclic hydrocarbons having hydroxyl groups. According to the number of hydroxyl groups one molecule has, monohydric, dihydric and polyhydric alcohols may be differentiated. If the hydroxyl group is on a primary carbon atom, these alcohols may be called primary alcohols. Monohydric, primary alcohols having 1 to 3 carbon atoms are very fluid liquids that can be mixed with water at any rate. Monohydric, primary alcohols having 4 to 12 carbon atoms are oily liquids, which are only water-miscible in certain proportions.

In the meaning of the present invention, alcohols are understood to mean only monohydric primary alcohols having 1 to 12 C atoms.

The preparation according to the invention advantageously contains alcohol having a content of not more than 5.0% by weight, in particular not more than 2.0% by weight, in relation to the total weight of the preparation, with the proviso that said ranges are not referring to ethanol.

The preparation according to the invention contains $\leq 0.1\%$ by weight of ethanol, in particular 0% by weight or 0.0001 to 0.01% by weight of ethanol, in relation to the total weight of the preparation.

As described above, the hair shaping preparation according to the invention contains no or only very small amounts of ethanol. Ethanol is known to have a function as a germicidal agent, i.e. ethanol may be used as a preservative. Furthermore, ethanol is a good solvent for

both hydrophilic and lipophilic substances. By not or hardly not using ethanol, a good preservative and a good solvent is not contained in the preparation for hair shaping any longer. Hence, a different way of preservation and different types of solubilizer have to be used in the hair shaping preparation according to the invention.

One or more emulsifier(s), being effective as solubilizers, are contained in the hair shaping preparation according to the invention.

Preferred emulsifiers are O/W-emulsifiers. O/W-emulsifiers are characterized by HLB values of 8 to 15. HLB values can be determined according to the following formula:

$$HLB = 20 \times (1 - M_{\text{lipophile}}/M),$$

wherein $M_{\text{lipophile}}$ represents the molecular weight of the lipophilic portion of the emulsifier and M represents the molecular weight of the entire emulsifier.

In general, emulsifiers having an HLB value up to about 8 are considered as W/O-emulsifiers. By contrast, O/W-emulsifiers have HLB values of greater than 8 to 15.

The following emulsifiers may act as O/W-emulsifiers:

Glyceryl stearate mixed with cetareth-20, cetareth-25, cetareth-6 in admixture with stearyl alcohol, cetylstearyl alcohol in admixture with PEG-40-ricinusöl and sodium cetylstearyl-sulfate, tricetareth-4-phosphate, sodium cetylstearylsulfate, lecithin trilaureth-4-phosphate, laureth-4-phosphate, Stearic acid, propylene glycol stearate SE, PEG-25 hydrogenated castor oil, PEG-54 hydrogenated castor oil, PEG 6 caprylic acid / capric acid glycerides, glyceryl oleate admixed with propylene glycol, ceteth-2, ceteth-20, polysorbate 60, glyceryl stearate in admixture with PEG-100 stearate, Laureth-4, cetareth-3, isostearyl glyceryl ether, cetylstearyl alcohol mixed with sodium cetyl stearyl sulfate, laureth-23, steareth-2, glyceryl stearate in admixture with PEG-30 stearate, PEG-40 stearate, glycol distearate, PEG-22 dodecyl glycol Copolymer, polyglyceryl-2-PEG-4 stearate, cetareth-20, methyl glucose sesquistearate, steareth-10, PEG-20 stearate, steareth-2 admixed with PEG-8 distearate, steareth-21, steareth-20, isosteareth-20, PEG-45 / dodecylglycol copolymer, methoxy-PEG-22 / dodecyl glycol copolymer, PEG-20 glyceryl stearate, PEG-20 glyceryl stearate, PEG-8 beeswax, polyglyceryl-2-laurate, isostearyl diglyceryl succinate, stearamidopropyl PG-dimonium chloride phosphate, Glyceryl stearate SE, ceteth-20, triethyl citrate, PEG-20 methyl glucose sesquistearate, cetareth-12, glyceryl stearate citrate, cetyl phosphate, tricetareth-4-phos-

phate, trilaureth-4-phosphate, polyglycerylmethyl glucose distearate, potassium cetyl phosphate, isosteareth-10, polyglyceryl-2-sesquiisostearate, ceteth - 10, oleth-20, isoceteth-20, glyceryl stearate admixed with cetareth-20, cetareth-12, cetylstearyl alcohol and cetyl palmitate, cetylstearyl alcohol in admixture with PEG-20 stearate, PEG-30 stearate, PEG-40 stearate, PEG- 100 stearate.

Preferred are those O/W-emulsifiers, which are characterized in that they are ethoxylated fatty alcohols or that they contain ethoxylated fatty alcohols in admixture with another emulsifier. More preferred are those ethoxylated fatty alcohols, whose alkyl residues are predominantly lauryl residues or only lauryl residues. Even more preference is given to the compounds Laureth-4, Laureth-5, Laureth-7, Laureth-9, Laureth-10 and Laureth-12. Further even more preference is given to the emulsifier Laureth-4, which for example may be obtained from Sasol under the trade name Marlosol PK 9040.

In the preparation according to the invention the one emulsifier or more emulsifiers is/are contained in a total amount of 0.05 to 1% by weight, preferably 0.1 to 0.5% by weight, in relation to the total weight of the preparation and in relation to the active content of the emulsifier.

The hair shaping preparation of the invention contains one or more preservatives. Preservatives, which may be used, are all preservatives, which are in accordance with the Cosmetics Regulation, with the proviso that ethanol is contained only with an amount $\leq 0.1\%$ by weight in relation to the total weight of the preparation or as otherwise specified in the present invention. Preference is given to a preservation with phenoxyethanol and/or parabens. It is particularly preferred, if phenoxyethanol is contained as a preservative. It is further particularly preferred, if a combination of phenoxyethanol and ethylhexyl glycerol is contained in the preparation of the present invention. Although ethylhexyl glycerol is not included in the list of preservatives that are allowed to be used in cosmetics, it is known that ethylhexyl glycerol may support the effect of certain preservatives, what may be described that ethylhexyl glycerol acts as a preservative booster.

The respective preservatives may be used individually or in combination. Advantageously, the total amount of one or more preservatives is/are in a range of 0.01 to 1.5% by weight, preferably 0.5 to 1.2% by weight, in relation to the total weight of the preparation and in relation to the active content of the respective preservative. Advantageously, ethylhexyl glycerol is contained in an amount of 0.01 to 1.0 % by weight, preferably 0.05 to 0.5 % by weight, more preferably 0.1 to 0.8 % by weight, in relation to the total weight of the preparation.

In an advantageous embodiment, additionally selected perfume raw materials are contained in the hair shaping preparation according to the invention. The incorporation of selected perfume raw materials has several advantages.

On the one hand, the hair shaping preparation itself may be perfumed in an appealing manner. This is important because the decision to buy a product and also to buy it again is not only determined by the actual product properties, which are often recognized and appreciated by the consumer only after prolonged use of a product, but also by an appealing perfume. Whether a perfume is liked, is determined by using a product tester in the store right at the moment of purchase.

On the other hand, perfume raw materials may be contained, which have comparatively low volatility, and therefore provide fragrance to the shaped hair.

The following perfume components are only a very small selection from the wide variety of perfume raw materials that may be incorporated into the hair styling formulation: coumarin, benzyl acetate, benzyl alcohol, benzyl benzoate, cinnamic aldehyde, cinnamyl alcohol, citral, citronellol, eugenol, geraniol, limonene, linalyl acetate, methyl benzoate and terpineol. This selection should only serve for illustration and by no means be limiting. Further examples of fragrances can be found, for example, in the book by S. Arctander "Perfume and Flavor Chemicals, Vol. I and II, Montclair, N.J., 1969 or later editions or other books of comparable content or patent literature in the field of scent science. Said literature is known to the person skilled in the art, who is involved in perfuming cosmetic products. The perfume raw materials may be divided into different groups, the person skilled in the art would address top notes, middle notes and base notes. Such a classification takes into account, for example, the volatility of the individual components. Perfume raw materials that may be assigned to the top notes are characterized by a greater volatility than those associated with the base notes. Referring to the components of the above selection, methyl benzoate, limonene and benzyl acetate may be classified as top notes, while coumarin, cinnamaldehyde and cinnamyl alcohol may be classified as base notes.

In addition to the volatility, the odor impression of the respective perfume raw materials also plays an important role and must be considered when creating a perfume mixture. A perfume mixture should always convey a well-balanced overall odor.

In the hair shaping preparation the perfume raw materials are contained as perfume mixtures and advantageously, the perfume mixtures being contained in an amount of 0.1 to 0.8 % by weight, in particular 0.2 to 0.5 % by weight, in relation to the total weight of the preparation for hair shaping.

In a further advantageous embodiment, components providing care are additionally contained in the hair shaping preparation according to the invention. In the meaning of the present invention components providing care are all substances that achieve a caring effect on the hair and the scalp. In the broadest sense a caring effect contributes to an improvement of the surface and/or structure of hair and/or scalp. The caring effect is limited to a cosmetic effect and is not a dermatological one. Since the preparation for hair shaping remains on the hair and is not immediately removed, the components providing care stay on the hair and/or scalp for a longer period of time, thus helping to improve hair and/or scalp.

In the context of the present invention, a variety of substances may act as components providing care, a selection of which is described below, namely lanolin, substances of the vitamins of the B group and/or the vitamin B complex, silicone compounds, polar oils and/or humectants.

According to the present invention is advantageous, if lanolin alcohol is used. Lanolin alcohol may be additionally contained in the preparation according to the invention. Lanolin alcohol is the unsaponifiable part of wool wax, comprising a mixture of alcohols having an average molecular weight of about 370 Da. Typical ingredients include cholesterol, lanosterol, agnosterol and their dihydro derivatives, as well as straight and branched chain aliphatic alcohols.

It is particularly preferred, if lanolin alcohol known under the trade name Eucerit® is contained. Eucerit® comprises a mixture of aliphatic alcohols, especially alkanols with chain lengths of C18 to C20, diols with chain lengths of C16 to C26 and sterols. The cholesterol content is at least 30% by weight of the raw material.

In the preparation according to the present invention lanolin alcohol is contained in an amount of 0.005 % by weight to 1 % by weight, preferably 0.005 % by weight to 0.2 % by weight, more preferably 0.005 % by weight to 0.01 % by weight, in relation to the total weight of the preparation for hair shaping.

According to the present invention, it is also advantageous, if additionally one or more substances of the vitamins of the B group and/or of the vitamin B complex are contained. Substances of the vitamin B group and/or of the vitamin B complex are usually water-soluble and have an important function in the cell metabolism of plants and animals.

According to the invention, examples of substances of the vitamins of the B group and/or of the vitamin B complex include thiamine (vitamin B1), riboflavin (vitamin B2), nicotinic acid (vitamin B3), nicotinamide (niacinamide), pantothenic acid (vitamin B5), panthenol (Provitamin B5), panthenol triacetate, panthenol monoethyl ether, pantolactone, pyridoxine and pyridoxal. It is preferred, if panthenol is contained in the preparation according to the invention.

For example, panthenol may be obtained from the company BASF under the trade name D-panthenol 75 W as a 77% solution in water.

Likewise it is preferred, if niacinamide is contained in the hair shapeing preparation according to the invention. For example, niacinamide may be obtained from the company Lonza.

According to the invention, one or more substances of the vitamins of the B group and/or of the vitamin B complex is/are contained in an amount of 0.005% by weight to 5% by weight, preferably 0.05% by weight to 2% by weight, particularly preferably 0, 01 % by weight to 1.0 % by weight, in relation to the total weight of the preparation for hair shaping and in relation of the active content of the respective substance contained in the preparation of the present invention.

According to the invention it is also advantageous, if one or more silicone compounds are additionally contained in the preparation according to the invention. Silicones are also known as poly (organo) siloxanes, being a group of synthetic polymers, in which silicon atoms are linked by oxygen atoms. Silicones consist of individual siloxane units. The terms silicone compound, silicone, poly (organo) siloxane and polysiloxane compound are used synonymously.

Silicones may be represented by the general formula $R_nSiO_{(4-n)/2}$ ($n = 0, 1, 2, 3$), illustrating that a siloxane unit may have one to four further substituents.

Siloxane units are therefore mono-, di-, tri- and tetrafunctional. In a symbolic notation the following letters represent:

M (mono), M corresponds to $R_3SiO_{1/2}$,

D (di), D corresponds to $R_2SiO_{2/2}$,

T (tri), T corresponds to $RSiO_{3/2}$ and

Q (quatro), Q corresponds to $SiO_{4/2}$.

Based on the fact that different siloxane units can be linked together in the molecule, a multitude of silicone compounds may be formed. Following the systematics of organic polymers, several groups may be differentiated:

- Cyclic polysiloxanes are ring-shaped of difunctional siloxane units, D_n.
- Linear polysiloxanes are built as MD_nM, or R₃SiO[R₂SiO]_nSiR₃, for example polydimethylsiloxane may be mentioned.
- Crosslinked polysiloxanes are chain- or ring-shaped molecules linked in flat or three-dimensional networks of tri- and tetrafunctional siloxane units. The formation of high molecular weight silicones is achieved by forming chains and crosslinking.

The elements effecting the branching of polysiloxanes are the trifunctional or tetrafunctional siloxane units, M_nD_mT_n. The branching points are found either in a polysiloxane chain or a ring.

Various substituents may be bound to the silicon atoms of the silicones, the substituents being very often methyl groups; accordingly linear, branched or crosslinked polydimethylsiloxanes may be differentiated. Depending on the length and degree of crosslinking different sized and complex molecules may be formed. In the case of liquid or free-flowing polydimethylsiloxanes, a characterization of which is given by using the appropriate viscosity values issued by the manufacturer or supplier.

In addition to the methyl groups as substituents, there are a variety of other substituents. In order to improve the solubility of the polysiloxanes and thus achieve a better incorporation into aqueous cosmetic preparations, alkoxy residues, in particular ethylene oxide residues, may be introduced into the polysiloxanes. Ethylene oxide residues are also referred to as polyethylene glycol residues, abbreviated to PEG.

According to the invention, it is advantageous, if polysiloxanes, which have 8 to 20 ethylene oxide residues, preferably 10 to 18 ethylene oxide residues, are used. A preferred example of such a polysiloxane compound is PEG-12 dimethicone, which for example may be purchased from Dow Corning under the trade name Xiameter OFX-0193 Fluid.

Advantageously, one or more polysiloxane compound (s) comprising 8 to 20 ethylene oxide residues, preferably 10 to 18 ethylene oxide residues, is/are contained in a total amount of 0.01 to 3% by weight, preferably 0.05 to 1.0% by weight, in the hair shaping preparation, in relation to the total weight of the preparation and in relation to the active content of said polysiloxane compound(s).

According to the invention, it is advantageous, if additionally one or more oils are contained in the preparation according to the invention. The oils may be selected from the group of polar oils, for example from the group of lecithins and fatty acid triglycerides, namely the triglycerol esters of saturated and/or unsaturated, branched and/or unbranched alkane carboxylic acids having a chain length of 8 to 24, in particular 12 to 18 C atoms. The fatty acid triglycerides may be selected, for example, advantageously from the group of synthetic, semi-synthetic and natural oils, such as coco glyceride, olive oil, sunflower oil, soybean oil, peanut oil, rapeseed oil, almond oil, palm oil, coconut oil, castor oil, wheat germ oil, grapeseed oil, thistle oil, evening primrose oil, macadamia nut oil and the like.

It is also advantageous, if squalene, a polyunsaturated organic compound from the group of triterpenes is contained in the preparation of the present invention.

In the context of the present invention, further advantageous polar oil components may be chosen from the group of esters of saturated and/or unsaturated, branched and/or unbranched alkane carboxylic acids having a chain length of from 3 to 30 carbon atoms and saturated and/or unsaturated, branched and/or unbranched alcohols having a chain length of 3 to 30 carbon atoms and from the group of esters of aromatic carboxylic acids and saturated and/or unsaturated, branched and/or unbranched alcohols having a chain length of 3 to 30 carbon atoms. Particularly advantageously, such ester oils may be selected from the group of octyl palmitate, octyl cocoate, octyl isostearate, octyl dodecyl myristate, cetearyl isononanoate, isopropyl myristate, isopropyl palmitate, isopropyl stearate, isopropyl oleate, n-butyl stearate, n-hexyl laurate, n-decyl oleate, isooctyl stearate, isononyl stearate, isononyl isononanoate, Ethylhexyl palmitate, 2-ethylhexyl laurate, 2-hexyldecyl stearate, 2-octyl dodecyl palmitate, stearyl heptanoate, oleyl oleate, oleyl erucate, erucyl oleate, erucyl erucate, tridecyl stearate, tridecyl trimellitate, as well as synthetic, semi-synthetic and natural mixtures of such esters, e.g. jojoba oil.

Furthermore, advantageously one or more oils may be selected from the group of dialkyl ethers and dialkyl carbonates, examples being dicaprylyl ether (available under the trade-name Cetiol OE) and/or or dicaprylyl carbonate (available under the trade name Cetiol CC).

Advantageously, any mixtures of said oil components may be contained in the preparations of the present invention.

Sunflower oil, castor oil, soybean oil, jojoba oil and macadamia oil are particularly preferred, they may be referred to as caring oils.

Advantageously, the oil or oils is/are contained in a total amount of 0.005 to 1.0% by weight, preferably 0.01 to 0.1% by weight, in relation to the total weight of the preparation.

According to the invention additionally one or more humectants may be contained in the preparation according to the invention. Humectants may impart moisture to the hair and/or scalp and/or help prevent the loss of moisture from hair and/or scalp. Humectants are hygroscopic substances capable of binding water. This water binding capacity is due to hydrophilic groups, mainly hydroxyl groups, but amine groups and carboxyl groups are also of importance. For example, humectants are propylene glycol, hexylene glycol, butylene glycol, glyceryl triacetate, glycerin, sorbitol, xylitol, maltitol, polydextrose, urea, aloe vera gel, honey and alpha hydroxy acids such as lactic acid. It is preferred, if propylene glycol and/or glycerol is/are contained in the preparation according to the invention.

In the preparation of the present invention the one humectant or more humectants is/are contained in a total amount of 0.01 to 1 % by weight, preferably 0.1 to 0.8 % by weight, in relation to the total weight of the preparation.

In a further advantageous embodiment, additionally one or more sunscreen filters are contained in the hair shaping preparation according to the invention. By using UV filters in the inventive preparation the UV filters come into contact with the hair and may be deposited on the hair, where the UV filters absorb UV rays. This is how the damaging effect of UV rays for the hair itself, but also for hair colors, as used in the permanent, semi-permanent and/or temporary hair dyeing compositions, may be reduced.

In the context of the present invention it is advantageous, if the UV filters are sulfonated and water-soluble, examples are:

- Phenylene-1,4-bis (2-benzimidazolyl) -3,3'-5,5'-tetrasulfonic acid and its salts, especially the corresponding sodium, potassium or triethanolammonium salts, especially the phenylene-1,4 bis (2-benzimidazolyl) -3,3'-5,5'-tetrasulfonic acid bis-sodium salt having the

- INCI name bisimidazylate (CAS No. : 180898-37-7), which is available, for example, under the trade name Neo Heliopan AP is available from Haarmann & Reimer;
- Salts of 2-phenylbenzimidazole-5-sulfonic acid, such as its sodium, potassium or its triethanolammonium salt, and the sulfonic acid itself with the INCI name phenylbenzimidazole sulfonic acid (CAS No. 27503-81-7), which, for example sold under the trade name Eusolex 232 by Merck or under Neo Heliopan Hydro by Haarmann & Reimer;
 - 1,4-di (2-oxo-10-sulfo-3-bornylidenemethyl) benzene (also: 3,3' - (1,4-phenylenedimethylene) bis- (7,7-dimethyl-2-) oxo-bicyclo [2.2.1] hept-1-ylmethane sulfonic acid) and its salts (especially the corresponding 10-sulfato compounds, in particular the corresponding sodium, potassium or triethanolammonium salt), which is also known as benzene 1,4-di (2-oxo-3-bornylidenemethyl-10-sulfonic acid) Benzene-1,4-di (2-oxo-3-bornylidenemethyl-10-sulfonic acid) having the INCI name Terephthalidene Dicampher Sulfonic acid (CAS No. : 90457-82-2) and is available, for example, under the trade name Mexoryl SX from Chimex;
 - sulfonic acid derivatives of 3-Benzylidencamphers, such as. B. 4- (2-oxo-3-bornylidenemethyl) benzenesulfonic acid, 2-methyl-5- (2-oxo-3-bornylidenemethyl) sulfonic acid and salts thereof.

Certain UV filters, which are readily soluble in organic solvents may also be contained in the preparation according to the present invention. For example, ethylhexyl methoxycinnamate (octinoxate), being available under the trade name Escalol 557 from Ashland Specialty Ingredients, is particularly suitable.

5-benzoyl-4-hydroxy-2-methoxybenzenesulfonic acid (benzophenone-4), which may be obtained, for example, under the trade name Uvinul MS 40 from BASF, is an example of a particularly suitable UV filter.

In the preparation of the present invention the UV filter(s) is/are contained in a total amount of 0.05 to 2% by weight, preferably 0.1 to 1.0% by weight, in relation to the total weight of the preparation.

In a further advantageous embodiment, one or more antioxidants are additionally contained in the hair shaping preparation according to the invention. Antioxidants are molecules that prevent other molecules from being oxidized. Oxidation reactions can cause free radicals, which in turn damage or destroy other molecules. For example, the free radicals can be rendered harmless by antioxidants. The antioxidants may comprise various molecules of natural or synthetic origin. Among the synthetic molecules, compounds such as butylhydroanisole

(BHA), butylhydroxytoluene (BHT) and pentaerythrityl tetra-di-t-butyl-hydroxyhydrocinnamate may be mentioned, butylhydroxytoluene being preferred according to the invention.

Advantageously, the at least one antioxidant may be contained in a total amount of 0.01 to 1.0% by weight, preferably of 0.02 to 0.7% by weight, in relation to the total weight of hair shaping preparation and in relation to the active content of the respective antioxidant(s).

In further advantageous embodiments, one or more perfume raw materials, one or more components providing care, preferably chosen from the various groups of components providing care, namely lanolin alcohol, substances of the vitamins of the B group and/or the vitamin B complex, silicone compounds, polar oils and/or humectants, one or more UV filters and/or one or more antioxidants are contained in the hair shaping preparation of the present invention.

The hair shaping preparation is contained in a container. The container is supplied with a spray pump having the characteristic elements of such pumps, namely a spray head, a nozzle, a piston, a turret, a stem, a gasket, a fitting, a sleeve, a spring, a body and a dip tube. For example, suitable spray pumps may be purchased from Seaquist Perfect with the name PZ 2.

The containers are advantageously made of plastic, in particular PET or PE. Likewise, containers of glass or metal are suitable.

A fine distribution of the hair shaping preparation on the hair is achieved, if the hair shaping preparation of the present invention is released from a container having a suitable spray pump. The hair having been sprayed in this way can be shaped intensively as the time frame is sufficiently long before the preparation is dried and the hairstyle is then fixed.

Examples

The following examples are intended to illustrate the invention without limiting it. The amounts refer to the respective active content. The amounts are given in % by weight.

INCI names / example	1	2	3	4	5
aminomethyl propanol	0,62	adj	adj	adj	adj
Acrylates Copolymer	5,8	5,0	4,2	3,3	2,9
ethylhexyl glycerol	0,25	0,25	0,3	0,2	---
lanolin alcohol	0,005	0,01	0,01	0,01	0,01
squalane	0,005	0,01			
laureth-4	0,4	0,5	0,4	0,3	0,6
perfume	0,4	0,4	0,3	0,35	0,5
phenoxyethanol	0,9	0,63	0,63	0,63	0,63
PEG-12 Dimethicone	---	0,2	---	---	---
panthenol	---	---	0,3	---	---
niacinamide	---	---	0,2	---	---
macadamia integrifolia seed oil	---	0,05	---	---	---
glycerol	---	---	---	0,5	---
propylene glycol	---	---	---	---	0,3
benzophenone-4	---	---	---	0,1	---
ethylhexyl methox- ycinnamate	---	---	0,4	---	---
triethyl citrate	---	---	---	0,1	---
benzylalkohol	---	---	---	---	0,15
Aqua	ad 100	ad 100	ad 100	ad 100	ad 100

Summary of INCI names and raw materials:

INCI name	Trade name / active content
PEG-12 Dimethicone	Xiameter OFX-0193 Fluid, Dow Corning, 100% active
Ethylhexyl glycerol	Sensiva SC 50, Schülke & Mayr, 100% active
glycerol	Glycerine 99,5% BP, Emery Oleochemicals, 99,5% active
propylene glycol	1,2-Propylene-Glycol CARE, BASF, 100% active
panthenol	D-Panthenol 75 W, BASF, 77% active
niacinamide	Niacinamide, Lonza, 99% active
squalane	Pripure 3759, Croda, 100% active
triethyl citrate	Hydagen C.A.T., BASF, 99,75% active
Benzyl alcohol	100981 Benzyl alcohol EMPROVE exp Ph Eur,BP,JP,NF Merck, 100% active
Benzophenone-4	Uvinul MS 40, BASF, 100% aktiv
ethylhexyl methoxycinnamate	Escalol 557, Ashland Specialty Ingredients, 99,95% active
PEG-40 hydrogenated castor oil	Eumulgin CO 40, 100% active
Ceteareth-20	Eumulgin B20® von Cognis
perfume	
laureth-4	Marlosol PK 9040, Sasol, 100% active
ethanol	Neutralalkohol Sorte 604 von Bundesmonopolverwaltung, 96,17% active
Acrylates Copolymer	Balance BDF, Akzo Nobel, 45% active
Aminomethyl propanol	AMP Ultra PC 2000, Angus, 95% active
Phenoxyethanol	Neolone PH 100 Preservative, Dow chemical, 100% active
Lanolin Alcohol	Lanolin Alcohol, CRM International 100% active
Macadamia Integrifolia Seed Oil	Extrapone Macadamia Nut GW CL, Symrise, 3% active

Claims

1. Pumpable preparation for hair shaping containing
 - a setting polymer selected from Acrylates Copolymers, especially dispersible in an emulsion,
 - one or more emulsifier(s),
 - one or more preservatives,
 - $\geq 50\%$ by weight of water, in relation to the total weight of the preparation, and
 - $\leq 0.1\%$ by weight of ethanol, in particular 0% by weight or 0.0001 to 0.01% by weight, in relation to the total weight of the preparation, andwherein the hair shaping preparation is contained in a pump spray container, the container being provided with a spray pump.
2. Preparation according to claim 1, characterized in that water is contained in an amount of 85 to 95 % by weight, preferably 89 to 92 % by weight, in relation to the total weight of the preparation.
3. Preparation according to claim 1 and/or 2, characterized in that the Acrylates Copolymer comprises the monomers acrylic acid, methacrylic acid and branched and/or unbranched C1 to C4 esters of acrylic acid and/or methacrylic acid.
4. Preparation according to at least one of the preceding claims, characterized in that the Acrylates Copolymer has an anionic charge density of 1 to 2 meq/g, in particular 1.3 to 1.8 meq/g.
5. Preparation according to at least one of the preceding claims, characterized in that the neutralizing agent of the Acrylates Copolymer is selected from 2-amino-2-methyl-1-propanol (AMP), 2-amino-2-methyl-1,3-propanediol (AMPD), mono-isopropanolamine, triisopropanolamine, sodium hydroxide and/or potassium hydroxide, preferably 2-amino-2-methyl-1-propanol (AMP).
6. Preparation according to at least one of the preceding claims, characterized in that the Acrylates Copolymer is provided as a raw material in form of an emulsion, especially an emulsion containing an anionic surfactant.
7. Preparation according to at least one of the preceding claims, characterized in that the Acrylates Copolymer is contained in an amount of 1.0 to 6.0 % by weight, preferably

3.5 to 5.9 % by weight, in relation to the total weight of the preparation and in relation to the active content of the Acrylates Copolymer.

8. Preparation according to at least one of the preceding claims, characterized in that the emulsifier(s) are O/W-emulsifier(s), in particular ethoxylated fatty alcohol(s) or ethoxylated fatty alcohol(s) in admixture with a further emulsifier.
9. Preparation according to at least one of the preceding claims, characterized in that the emulsifier(s) is/are selected from Laureth-4, Laureth-5, Laureth-7, Laureth-9, Laureth-10 and/or Laureth-12.
10. Preparation according to at least one of the preceding claims, characterized in that the one emulsifier or more emulsifiers is/are contained in a total amount of 0.05 to 1 % by weight, preferably 0.1 to 0.5 % by weight, in relation to the total weight of the preparation and in relation to the active content of the emulsifier(s).
11. Preparation according to at least one of the preceding claims, characterized in that one or more preservative(s) are contained, preferably chosen from phenoxyethanol and/or parabens.
12. Preparation according to at least one of the preceding claims, characterized in that the one or more preservatives is/are contained in a total amount of 0.01 to 1.5 % by weight, preferably 0.5 to 1.2 % by weight, in relation to the total weight of the preparation and in relation to the active content of the respective preservative.
13. Preparation according to at least one of the preceding claims, characterized in that a combination of phenoxyethanol and ethylhexyl glycerol is contained.
14. Preparation according to at least one of the preceding claims, characterized in that ethylhexyl glycerol is contained in an amount of 0.01 to 1.0 % by weight, preferably 0.05 to 0.5 % by weight, more preferably 0.1 to 0.8 % by weight, in relation to the total weight of the preparation.
15. Preparation according to at least one of the preceding claims, characterized in that additionally a mixture of perfume raw materials is contained, preferably with an amount of 0.1 to 0.8 % by weight, more particularly 0.2 to 0.5 % by weight, in relation to the total weight of the preparation.

16. Preparation according to at least one of claims 1 to 14, characterized in that additionally one or more components providing care, selected from lanolin, substances of the vitamins of the B group and/or the vitamin B complex, silicone compounds, polar oils and/or humectants are contained.
17. Preparation according to at least one of claims 1 to 14, characterized in that additionally one or more UV filter(s) are contained, preferably in a total amount of 0.05 to 2.0 % by weight, more preferably 0.1 to 1.0 % by weight, in relation to the total weight of the preparation.
18. Preparation for hair shaping according to claims 1 to 14, characterized in that additionally one or more antioxidant(s) is/are contained, preferably in a total amount 0.01 to 1.0% by weight, preferably of 0.02 to 0.7% by weight, in relation to the total weight of the preparation and in relation to the active content of the antioxidant(s).
19. Preparation for hair shaping according to at least one of claims 1 to 14, characterized in that additionally
 - a combination of perfume raw materials,
 - one or more components providing care, in particular selected from lanolin alcohol, substances of the vitamins of the B group and/or the vitamin B complex, silicone compounds, polar oils and/or humectants,
 - one or more UV filters and/or
 - one or more antioxidants is/are contained.
20. Use of the hair shaping preparation according to at least one of the preceding claims for shaping and fixing hair in one step.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/072954

A. CLASSIFICATION OF SUBJECT MATTER INV. A61K8/81 A61Q5/06 A61K8/04 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) A61K A61Q		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE GNPD [Online] MINTEL; 1 February 2016 (2016-02-01), "Root Lifting Spray", XP002794948, Database accession no. 3755021 the whole document -----	1,20
X	DATABASE GNPD [Online] MINTEL; 2 July 2018 (2018-07-02), "Air Spray Alcohol Free Hairspray", XP002794949, Database accession no. 5836536 the whole document ----- -/-	1-20
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 14 October 2019		Date of mailing of the international search report 04/11/2019
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Yon, Jean-Michel

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/072954

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE GNPD [Online] MINTEL; 1 August 2005 (2005-08-01), "Styling gel", XP002794950, Database accession no. 10230271 the whole document -----	1-20
X	DATABASE GNPD [Online] MINTEL; 1 September 2016 (2016-09-01), "Elasticity Styling Spray", XP002794951, Database accession no. 4269089 the whole document -----	1-20
X	EP 2 570 110 A2 (PROCTER & GAMBLE [US]) 20 March 2013 (2013-03-20) paragraphs [0004], [0006], [0026], [0028], [0056] - [0058], [0099], [0127]; claims 1,5,14; examples 1-11,13-16 -----	1,20
X	US 2015/000687 A1 (BROWN JODI LEE [US] ET AL) 1 January 2015 (2015-01-01) paragraphs [0042], [0055], [0072], [0077]; claims 1,6,18,19 -----	1-20

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Information on patent family members

International application No

PCT/EP2019/072954

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