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(54) Title: HAIR CONDITIONING COMPOSITION CONTAINING PENTAERYTHRITOL ESTER AND PPG ALKYL ETHER

(57) Abstract: The present invention belongs to the cosmetic field and relates to a hair conditioning composition comprising one or more pentaerythritol esters and one or more PPG alkyl ethers. The composition shows a comparable or even an improved conditioning effect in relative to silicone oil containing compositions, whereby the effect of the hair being weighed down is reduced in comparison to the silicon oil containing composition.



WO 2017/167579 A1

Hair conditioning composition containing pentaerythritol ester and PPG alkyl ether

Technical field

The present invention belongs to the cosmetic field and relates to a hair conditioning composition comprising one or more pentaerythritol esters and one or more PPG alkyl ethers. The composition according to the present invention does not weigh down the hair and at the same time reduces the roughness of the hair. Thereby, the composition according to the present invention can be a shampoo, a cleansing or solely a conditioning composition, which may be applied to the hair and afterwards rinsed off with water, or which remains in the dry or wet hair after application.

Technical background

A beautiful and attractive appearance is a desire for many people. Therefore, an essential part of the daily personal care of humans is focus on the hair of the head. Cleansing and shampoo products are commonly used to remove excess of soil or sebum from the hair. However, these products often leave the hair in a dry and rough condition. To address this issue many cleansing and shampoo products contain conditioning agents to provide a conditioning effect. Alternatively, a separate conditioner product can also be used after cleansing or shampooing the hair. These separate conditioners can be formulated either as a rinse-off product, which is applied to the hair and afterwards rinsed off with water, or as a leave-in product, which remains in the dry or wet hair after application. Generally, separate conditioner provides a far better conditioning effect to the hair than cleansing or shampoo products including conditioning agents.

The purpose of the conditioning agents of the above products is not only to reduce the dryness and roughness of the hair. Moreover, the richness and slipperiness, as well as the gliding and combability of the hair are improved by the conditioning agents. Typically used conditioning agents are silicone containing compounds. However, these are well known for the fact that silicone residues can build up on the hair. As a result these silicone residues weigh down the hair, which reduces the hair volume. In particular, this can become an issue for consumers with fine hair wishing to build up volume. Therefore, it remains desirable to provide alternative conditioning compositions, which provide an enhanced hair volume by reducing the effect of residues weighing down the hair.

EP 2138155 A2 discloses silicone free hair conditioning compositions, which include PPG-3 benzyl ether myristate to reduce the weighing down of hair while providing a conditioning effect. EP 2138155 A2 does not disclose the use of PPG alkyl ether and pentaerythritol ester.

WO 2002100360 A1 teaches the use of a cellulose polymer, a cationic surfactant, a high melting point fatty acid and an aqueous carrier in a hair conditioning composition. PPG-3 myristyl ether and PPG-11 stearyl ether are included in the example formulations as emollient. In the description pentaerythritol ester oils are mentioned as useful components for the formulations. The document is silent on any conditioning effect provided by any PPG alkyl ether and pentaerythritol ester.

WO 0174312 A2 discloses hair conditioning compositions which contain pentaerythritol ester oils (Page 40, line 29 to page 41). These shall provide benefits such as moisturize, smooth feel, manageability control to the hair. WO 0174312 A2 teaches that pentaerythritol ester oils cover the surface of the hair and thereby delivers smoothness and manageability control to the hair. Therefore, it can be assumed that the hair is likely to weigh down by attaching pentaerythritol ester oils to its surface. Moreover, there is no mentioning of PPG alkyl ether in WO 0174312 A2.

Further documents addressing the weigh down effect of hair conditioning compositions are for example WO 0182879 A2, EP 1815841 A1 and EP 2462918 A2. None of the documents cited discloses any guidance to the present invention.

Summary of invention

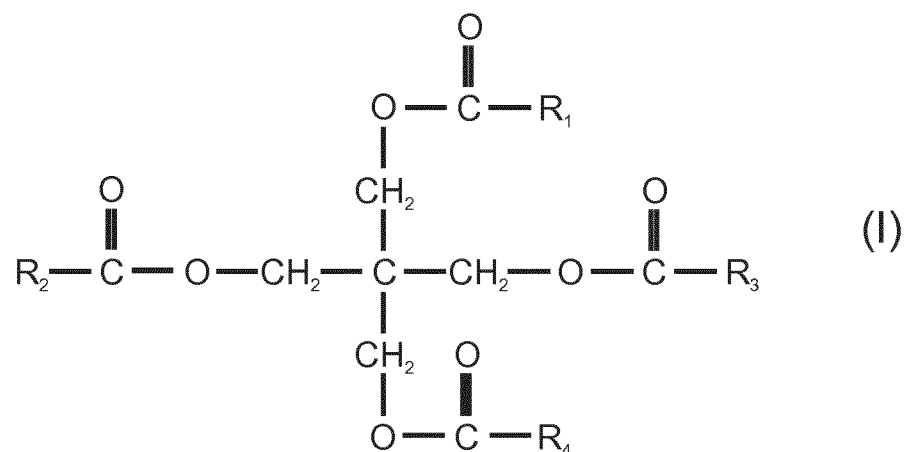
The present invention is to provide a conditioning composition which provides an effective conditioning to the hair upon use whereby the effect of hair being weighed down by residues after application of the conditioner is reduced.

It has surprisingly been found out that a hair conditioning composition comprising one or more pentaerythritol esters and one or more PPG alkyl ethers provides not only an effective conditioning of the hair, moreover, it was found that the effect of the hair being weighed down is improved. In particular, it was unexpected that the inventive

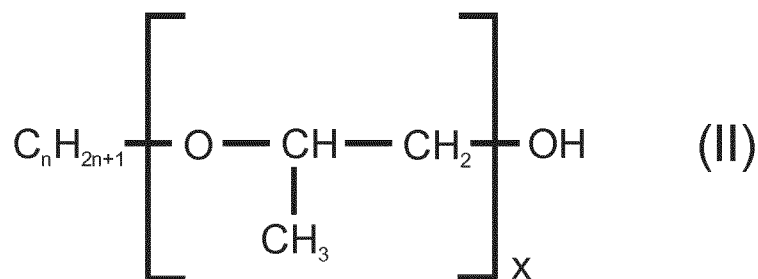
composition showed a comparable or even an improved conditioning effect relative to silicone oil containing compositions, whereby the effect of the hair being weighed down was found to be reduced in comparison to the silicon oil containing composition.

Especially in the view of the above discussed document WO 0174312 A2 it was surprising that after use of the composition of the present invention the hair does not weigh down.

Accordingly, the first object of the present invention is a conditioning composition for hair comprising one or more pentaerythritol esters of the following formula (I)



wherein R₁, R₂, R₃ and R₄ are straight or branched, saturated or unsaturated alkyl chains with 5 to 24 C atoms, and one or more PPG alkyl ethers of the following formula (II)



wherein n is an integer in the range from 1 to 12, and x is an integer in the range from 2 to 40.

The term “PPG” stands for polypropylene.

A further object of the present invention is the use of the composition of the present invention as conditioner for human hair, whereby the effect of hair being weighed down by the conditioning agents is reduced.

Still a further object of the present invention is the method of conditioning human hair, comprising steps of applying the composition of the present invention to the hair and optionally rinsing off the composition after its application within 1 to 60 minutes.

Specifically, the conditioning composition of the present invention comprises one or more pentaerythritol ester as defined in formula I. Thereby the pentaerythritol ester is preferred selected from pentaerythrityl tetraethylhexanoate, pentaerythrityl tetracaprylate, pentaerythrityl tetranonanoate, pentaerythrityl tetralaurate, pentaerythrityl tetramyristate, pentaerythrityl tetrastearate, pentaerythrityl tetraoleate, pentaerythrityl tetrabeheenate, pentaerythrityl

tetraisononanoate, pentaerythrityl tetraisostearate and mixtures thereof. The most preferred pentaerythritol ester is pentaerythrityl tetraisostearate.

Pentaerythrityl tetraisostearate is commercially available under the trade name CRODAMOL PTIS-LQ-(MV) from the Fa. Croda Inc.

The total concentration of pentaerythritol esters in the composition of the present invention is in the range from 0.05% to 5%, preferably 0.1% to 3% and more preferably 0.15% to 1% by weight calculated to the total composition.

In a preferred embodiment of the present invention only pentaerythrityl tetraisostearate is included as pentaerythritol ester in a concentration in the range from 0.05% to 5%, preferably 0.1% to 3% and more preferably 0.15% to 1% by weight calculated to the total composition.

Conditioning compositions of the present invention comprise one or more PPG alkyl ethers as defined by formula II. Preferred PPG alkyl ethers are defined by n being an integer in the range from 4 to 8 and x being an integer in the range from 2 to 15. More preferred are PPG-14-butyl ether, PPG-3-caprylylether and their mixtures.

PPG-14-butyl ether is commercially available under the trade name UCON Fluid AP from the Fa. Dow Chemical. PPG-3-caprylyl ether is available under the trade name KAO SOFCARE® GP-1 from the Fa.

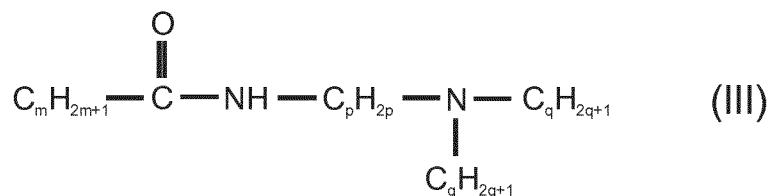
Kao Chemicals.

The total concentration of PPG alkyl ethers in the composition of the present invention is in the range from 0.05% to 5%, preferably 0.1% to 4% and more preferably 0.15 to 2.5% by weight calculated to the total composition.

In a preferred embodiment of the present invention only PPG-14-butyl ether and PPG-3-caprylyl ether are included as PPG alkyl ethers. The total concentration of PPG-14-butyl ether and PPG-3-caprylyl ether is in the range from 0.05% to 5%, preferably 0.1% to 4% and more preferably 0.15 to 2.5% by weight calculated to the total composition. Thereby the weight ratio of PPG-14-butyl ether to PPG-3-caprylyl ether is preferably in the range 2:1 to 1:2, more preferably 1.5:1 to 1:1.5.

The conditioning compositions of the present invention may be a cleansing composition such as a shampoo or cleanser, or a composition which can be applied after cleansing such as a leave-in conditioner or rinse-off conditioner.

The hair conditioning composition of the present invention can further comprise as additional conditioning agent one or more amidoamines defined by the formula (III)



wherein m is an integer in the range from 11 to 23, p is an integer in the range from 1 to 4 and q is an integer in the range from 1 to 4.

By adding one or more amidoamines the volume of the dried hair is further increased after cleansing and/or conditioning the hair with the inventive composition. Preferred amidoamines of the present invention are stearamidopropyl dimethyl amine, stearamidopropyl diethyl amine, stearamidoethyl diethyl amine, stearamidoethyl dimethyl amine, palmitamidopropyl dimethyl amine, palmitamidopropyl diethyl amine, palmitamidoethyl diethyl amine, palmitamidoethyl dimethyl amine, behenamidopropyl dimethyl amine, behenamidopropyl diethyl amine, behenamidoethyl diethyl amine, behenamidoethyl dimethyl amine, arachidamidopropyl dimethyl amine, arachidamidopropyl diethyl amine, arachidamidoethyl diethyl amine, arachidamidoethyl dimethyl amine and mixtures thereof. The most preferred amidoamines are stearamidopropyl dimethyl amine and/or behenamidopropyl dimethyl amine. According to the invention amidoamines as defined above are not considered as surfactant.

Stearamidopropyl dimethyl amine is commercially available under the trade name TEGO AMID S 18 from the Fa. Evonik Industries. Behenamidopropyl dimethyl amine can commercially be obtained under the trade name AMIDET® APA-22 from the Fa. Kao Chemicals.

The concentration of the one or more amidoamines in total is in the range of preferably 0.1% to 5%, more preferably 0.25% to 4% and most

preferably 0.4% to 3% by weight calculated to the total composition.

In a preferred embodiment of the present invention only stearamidopropyl dimethyl amine and/or behenamidopropyl dimethyl amine are included as amidoamines. In this embodiment of the present invention the total concentration of stearamidopropyl dimethyl amine and/or behenamidopropyl dimethyl amine is in the range of preferably 0.1% to 5%, more preferably 0.25% to 4% and most preferably 0.4% to 3% by weight calculated to the total composition.

The composition of the present invention can preferably contain one or more fatty alcohols. Preferably the fatty alcohols correspond to the formula $R_5\text{-OH}$ in which R_5 stands for a saturated or unsaturated, linear or branched hydrocarbon group, wherein the hydrocarbon group comprises 8 to 30 carbon atoms, more preferably 14 to 18 carbon atoms. Among those preferred fatty alcohols linear, saturated alcohols such as cetyl alcohol, stearyl alcohol and/or mixtures thereof are the most preferred ones.

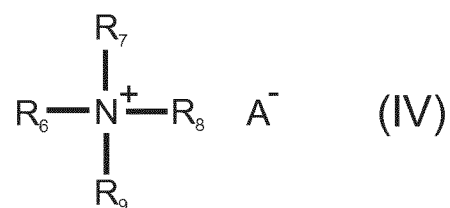
Cetyl alcohol is commercially available under the trade name Lanette® 16 from the Fa. BASF. Similarly, stearyl alcohol can be purchased under the trade name Lanette® 18 from the Fa. BASF. Mixtures of Cetyl alcohol and stearyl alcohol can also be obtained from the Fa. BASF. The trade name of the mixture is called Lanette® O.

The fatty alcohols are preferably used in a total concentration of 2% to 12% by weight, more preferably 3% to 10% by weight, most

preferably 4% to 9% by weight calculated to the total composition.

In a preferred embodiment of the present invention only cetyl alcohol, stearyl alcohol and/or mixtures thereof are included as fatty alcohol. In this embodiment of the present invention the concentration of cetyl alcohol, stearyl alcohol and/or mixtures thereof is in the range of 2% to 12% by weight, preferably 3% to 10% by weight, more preferably 4% to 9% by weight calculated to the total composition.

The compositions according to the invention may also preferably comprise one or more cationic surfactants. Suitable cationic surfactants which can be used in the conditioning compositions of the present invention are quaternary ammonium salts defined by the formula (IV)



wherein R₆ and R₇ stand for a hydrogen atom or an alkyl chain of 1 to 4 carbon atoms which are optionally substituted with one or more hydroxyl groups,

and wherein R₈ stands for a saturated or unsaturated, branched or non-branched alky chain of 8 to 24 carbon atoms,

or R₈ stands for R₁₀CON(CH₂)_y group, wherein R₁₀ is a saturated or unsaturated, branched or non-branched alkyl chain with 7 to 21 carbon atoms and y is an integer in the range from 1 to 4,

or R₈ stands for R₁₁COO(CH₂)_z group, wherein R₁₁ stands for a

saturated or unsaturated, branched or non-branched alkyl chain with 7 to 21 carbon atoms and z is an integer in the range from 1 to 4,

and wherein R_9 stands for a hydrogen atom or for a saturated or unsaturated, branched or non-branched alkyl chain of 8 to 24 carbon atoms,

or R_9 stands for a $R_{10}CON(CH_2)_y$ or $R_{11}COO(CH_2)_z$ group, wherein R_{10} , R_{11} , y and z have the same meaning as above,

and A is an anion, preferably chloride or bromide.

Suitable but not limiting examples of above defined cationic surfactants are octyltrimethylammonium chloride, decyltrimethylammonium chloride, dodecyltrimethylammonium chloride, cetyltrimethylammonium chloride, stearyltrimethylammonium chloride, behenyltrimethylammonium chloride, tetramethylammonium chloride, tetraethylammonium chloride, cetylpyridinium chloride, octyldimethylbenzylammonium chloride, decyldimethylbenzylammonium chloride, stearyldimethylbenzylammonium chloride, didodecyldimethylammonium chloride and dioctadecyldimethylammonium chloride.

The most preferred cationic surfactants to be contained in the compositions of the present invention are cetyltrimethylammonium chloride and/or behenyltrimethylammonium chloride. Cetyltrimethylammonium chloride is available under the trade name VARISOFT 300 from the Fa. Evonik Industries or Dehyquart® A-CA from the Fa. BASF. Behenyltrimethylammonium chloride is commercially available under the trade name QUARTAMIN® AB from

the Fa. Kao Chemicals.

The cationic surfactants are preferably used in a concentration in the range from 0.1% to 5% by weight, more preferably 0.2% to 3% by weight, calculated to the total composition. The values are referring to the active content of the cationic surfactants.

In a preferred embodiment of the present invention only cetyltrimethylammonium chloride and/or behenyltrimethylammonium chloride are included as cationic surfactant. In this embodiment of the present invention the total concentration of cetyltrimethylammonium chloride and/or behenyltrimethylammonium chloride is preferably in the range from 0.1% to 5% by weight, more preferably 0.2% to 3% by weight, calculated to the total composition. The values are referring to the active content of the cationic surfactants.

Additionally citric acid or lactic acid may be added to the composition of the present invention to adjust the pH value. A pH value in the range from 3.0 to 6.9, preferably 3.5 to 6.5 is desirable for hair conditioning compositions.

Additionally, the hair conditioning composition of the present invention may comprise water in a concentration of preferably more than 80% by weight, more preferably more than 85% by weight calculated to the total weight of the composition.

Furthermore, the hair conditioning composition of the present

invention may preferably comprise one or more surfactants selected from anionic, amphoteric and/or nonionic surfactants.

Suitable anionic surfactants include alkyl sulphates, alkyl ether sulphates, alkaryl sulphonates, alkanoyl isethionates, alkyl succinates, alkyl sulphosuccinates, alkyl ether sulphosuccinates, alkyl phosphates, alkyl ether phosphates, alkyl ether carboxylic acids and salts thereof, e.g. the sodium, magnesium, ammonium and mono-, di- and triethanolamine salts, or suitable mixtures thereof. The alkyl groups of the above listed anionic surfactants contain from 8 to 18 carbon atoms wherein the alkyl groups can be saturated or unsaturated. The alkyl ether sulphates, alkyl ether sulphosuccinates, alkyl ether phosphates, alkyl ether carboxylic acids and salts thereof contain from 1 to 20 ethylene oxide or propylene oxide units per molecule.

Preferred anionic surfactants for use in the conditioning composition of the present invention are sodium oleyl succinate, ammonium lauryl sulphosuccinate, sodium lauryl sulphate, sodium lauryl ether sulphate, sodium lauryl ether sulphosuccinate, ammonium lauryl sulphate, ammonium lauryl ether sulphate, sodium dodecylbenzene sulphonate, triethanolamine dodecylbenzene sulphonate, sodium cocoyl isethionate, sodium lauryl isethionate, and/or lauryl ether carboxylic acid.

Typical examples of amphoteric surfactants, which can be contained in the conditioning composition of the present invention, are alkyl betaines, alkyl amidopropyl betaines, cocoamidopropylbetaine,

alkyl sulphobetaines, alkyl amine oxides, alkyl amphotacetates, alkyl amphopropionates, alkyl amidopropyl hydroxysultaines and/or acyl taurates, wherein the alkyl and acyl groups comprise 8 to 19 carbon atoms. Preferred amphoteric surfactants are selected from lauryl amine oxide, cocodimethyl sulphopropyl betaine, lauryl betaine and cocamindopropylbetaine, sodium lauroamphoacetate and/or sodium cocoamphoacetate.

Suitable non-ionic surfactants include alkylamine oxide, N-alkyl-N-methyl glucamide, alkyl polyglucosides, coco mono- or di-ethanolamide, coco mono-isopropanolamide and/or condensation products of aliphatic (C₈ to C₁₈) primary, secondary linear or branched chain alcohols or phenols with ethylene oxides, generally having from 2 to 30 ethylene oxide groups.

Compositions of the present invention may further contain one or more silicone oils as conditioning agent. Typically used silicone oils are dimethicone, dimethiconol, polydimethylsiloxane and/or their derivatives. However, as the composition of the present invention solely provides a conditioning of the hair, it is preferred that the composition of the present invention is free of silicone oils. Free of silicone oils means that the total concentration of silicone oils is less than 0.001% by weight calculated to the total composition.

Hence, a further advantage of the present invention is that hair conditioning compositions can preferably be formulated without the use of silicone oils while maintaining their conditioning properties.

The compositions of the present invention may further contain cationic polymers known under CTFA category name polyquaternium-j as additional conditioning agent, wherein the letter j is an integer in the range from 1 to 100. Preferred polyquaternium polymers, which are known for their hair conditioning properties, are polyquaternium-7, polyquaternium-11, polyquaternium-44, polyquaternium-70 and polyquaternium-74.

However, as the composition of the present invention solely provides a conditioning of the hair, it is preferred that the composition of the present invention is free from polyquaternium polymers. The term “free from” means in the sense of the present invention that the total concentration of one or more polyquaternium polymers in the composition of the present invention does not exceed 0.05% by weight, calculated to the total composition.

Further cationic polymers which may be applied as additional conditioning agent in the composition of the present invention are for example the silicone-free quaternium polymers known under the CTFA category name quaternium-k, wherein the letter k is an integer in the range from 8 to 95.

However, as the composition of the present invention solely provides a conditioning of the hair, it is preferred that the composition of the present invention is free from quaternium polymers. The term “free from” means in the sense of the present invention that the total

concentration of one or more quaternium polymers in the composition of the present invention does not exceed 0.05% by weight, calculated to the total composition.

The composition of the present invention may further comprise one or more cellulose containing ionic or nonionic polymers, which provide an additional conditioning effect. These are for example cellulose gum, cocodimonium hydroxypropyloxyethylcellulose, ethyl cellulose, guar gum, guar hydroxytrimonium chloride, guar hydroxypropyltrimonium chloride, hydroxybutyl cellulose, cetyl hydroxyethyl cellulose, hydroxyethyl cellulose, hydroxyethyl ethylcellulose, hydroxymethyl cellulose, hydroxypropyl cellulose, hydroxypropyl guar, hydroxypropyl guar hydroxypropyltrimonium chloride.

However, as the composition of the present invention solely provides a conditioning of the hair, it is preferred that the composition of the present invention is free from cellulose containing ionic or nonionic polymers. The term “free from” means in this context that the total concentration of one or more cellulose containing ionic or nonionic polymers in the composition of the present invention does not exceed 0.05% by weight calculated to the total composition.

Another category of conditioning agents which may optionally be added to the composition of the present invention are protein and polyprotein hydrolysates, such as hydrolyzed silk, hydrolyzed wheat protein and/or hydrolyzed collagen.

The conditioning composition of the present invention may further comprise one or more preservatives. Suitable preservatives to be comprised in the composition of the present invention are for example phenoxyethanol, ethylhexyglycerin methylparaben, ethylparaben, benzyl alcohol, methylisothiazolinone, methylchloroisothiazolinone and/or DMDM hydantoin.

Furthermore, the composition of the present invention is preferably free from esters of PPG alkyl ethers or PPG aryl ethers. The term “free from” means in this context that the total concentration of one or more esters of PPG alkyl ethers or PPG aryl ethers in the composition of the present invention does not exceed 0.05% by weight, calculated to the total composition.

The conditioning composition of the present invention may further comprise pearlescent pigments, mica and/or effect pigments to prepare visually attractive compositions.

The composition according to the invention may also comprise substances commonly contained in hair conditioning compositions. These are for example UV-filter, dyes, ubiquinone such as coenzyme Q10, vitamins, plant extracts, antioxidants such as oryzanol, and fragrances.

It is further advantageous if the inventive composition is filled and kept in a jar, a bottle, a squeeze bottle, a pump spray or an aerosol can.

Com = Comparative example, not according to the invention

Inv = Inventive example, according to the invention

¹ VARISOFT 300, from Evonik

² TEGO AMID S 18, from Evonik

³ Xiameter PMX-200 Fluid, from Dow Corning

⁴ CRODAMOL PTIS-LQ-(MV), from Croda

⁵ UCON Fluid AP, from Dow

⁶ Sofcare GP-1, from Kao

The following test was carried out to show that by use of the inventive composition a solution for the problem introduced above is provided. The test performed was a half head test. That means a test was performed wherein the hair of one side of the head was treated with one composition while the hair on the other side of the head was treated with another composition. The assessment was carried out by trained hairdressers. Asian black hair was used for the test presented herein.

The conditioning of hair is dependent on a number of parameters. According to the invention the conditioning of hair corresponds to the reduction of roughness, as well as an enhancement of the richness, slipperiness, glide ability and combability of the hair. Therefore, in order to value the conditioning effect of the compositions all the following parameters were assessed by the hair dressers: Richness, Slipperiness, gliding, combability and anti-roughness.

The detailed test procedure was as follows:

Initially, the condition of the hair of each subject was evaluated by the hair dresser. Then the hair of each subject was washed using a

shampoo composition which was free of any conditioning agent. For that purpose the hair was wetted with warm water, then shampoo was applied and spread through the hair for 15 seconds. For each test the same amount of shampoo was applied. Afterwards the shampoo composition was rinsed off the hair with warm water until no shampoo remained. Before applying the example compositions to be tested, the hair was separated from the middle of the head and each side clipped up.

For each test, the clip on one side of the head was released and 1 g of one of the example compositions **1** to **8** per 10 g hair was spread on the wet hair for 15 seconds. Thereby the richness and slipperiness was accessed by the hair dresser. Each composition remained in the hair for 3 to 5 minutes.

Afterwards, the example composition was rinsed-off with water until the hair was visibly free of the applied composition. Thereby, the gliding while rinsing was accessed by the hair dresser.

After rinsing, the spare water was removed from the hair using a towel. Subsequently, the wet combability was accessed by the hair dresser using a fine-toothed comb. Then the wet gliding was evaluated by the hair dresser.

To access the remaining parameter the hair was fully blow-dried. Then the combability of dry hair was accessed by the hair dresser using a fine-toothed comb. Furthermore, the gliding of the dry hair, the roughness on the tip of the hair and the question if the hair does not

weigh down were evaluated by the hair dresser.

Each parameter was rated with a score value between 1 and 10, whereby 1 means bad and 10 corresponds to good. Here, it should be noted that the roughness was assessed as anti-roughness parameter to ensure that a score of 10 corresponds to a positive conditioning effect. The same is true for the analysis of the weigh down effect. In the case the hair does not weigh down at all a score of 10 is given.

As the parameters richness, slipperiness, gliding, combability and anti-roughness contribute to the conditioning capabilities of the compositions, the scores achieved for the parameters were summed to value the total conditioning performance of the compositions.

All the results are presented in the following Table:

Salon test	Ex.1	Ex.2	Ex.3	Ex.4	Ex.5	Ex.6	Ex.7	Ex.8
Richness (spread)	7.13	7.13	6.2	6.5	6.65	6.3	7.03	7.5
Slipperiness (spread)	7.3	7.38	6.05	6.85	6.55	6.3	7.05	7.63
Gliding (rinsing)	8.5	9	7.05	7.85	7.55	7.25	8.5	9
Combability (wet hair)	7.5	8.5	6	6.8	6.4	6.3	7.53	8.63
Gliding (wet hair)	6.85	7.63	5.75	6.65	6.2	5.75	7.35	7.55
Combability (dry hair)	8	8.63	7.05	7.25	7.4	7.55	8.13	8.63
Gliding	7	7.5	6.8	7.3	7.53	7.5	7.43	7.75

(dry hair)								
Anti-roughness (dry hair)	8.75	9.38	8.25	8.4	8.4	8.6	8.75	9.38
Conditioning value	61.03	65.15	53.15	57.6	56.68	55.55	61.77	66.07
Does not weigh down your hair	6.9	6.75	7.2	7.15	7.15	7.25	7.05	7

In the above Table showing the results of the tests the lowest conditioning value was determined for the reference composition 3, which did neither contain a pentaerythritol ester nor a PPG alkyl ether. Considering the differences between the compositions containing only one of the inventive substances in the samples 4, 5 and 6 with respect to the composition value determined for the reference composition 3, an over additive conditioning value was determined for the inventive compositions 7 and 8.

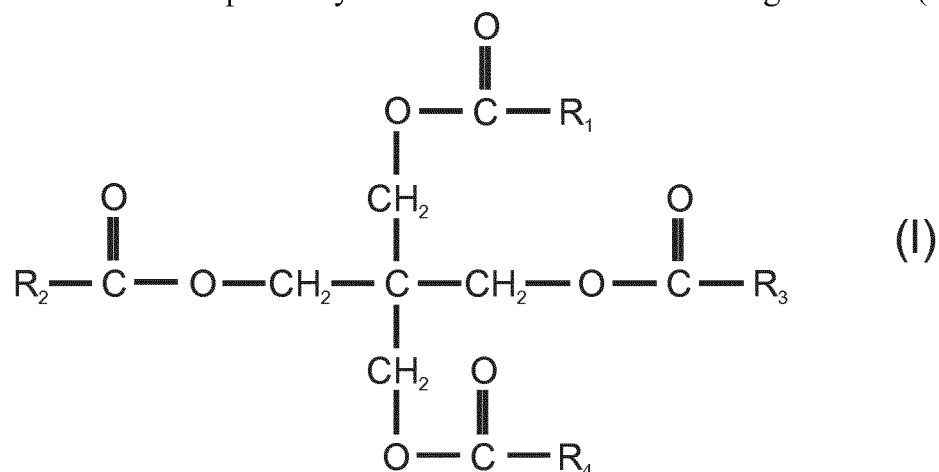
Comparing the conditioning values achieved with the silicon containing composition 1 to the inventive composition 7, it has to be noted that a comparable or better condition value is achieved using the inventive composition. The same is true for the comparison of the results achieved for the compositions 2 and 8. Here, it needs to be emphasized that the total concentration of the pentaerythritol ester and the PPG alkyl ether in the inventive composition 7 is lower than the total concentration of silicone oil in the composition 1. The same is true for the inventive composition 8 and the silicone oil containing composition 2.

The results for the question, if after the conditioning the hair is weighed down, reveal that the inventive composition outperforms silicon containing compositions. The effect of the conditioner residues weighing the hair down has been found to be reduced for the use of the inventive composition.

Claims

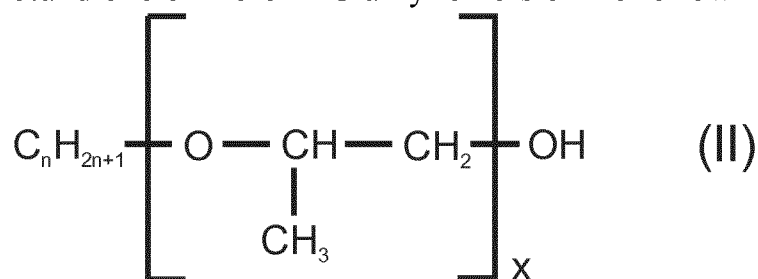
1. Hair conditioning composition comprising

a. one or more pentaerythritol esters of the following formula (I)



wherein R₁, R₂, R₃ and R₄ are straight or branched, saturated or unsaturated alkyl chains with 5 to 24 C atoms, and

b. and one or more PPG alkyl ethers of the following formula (II)



wherein n is an integer in the range from 1 to 12, and x is an integer in the range from 2 to 40.

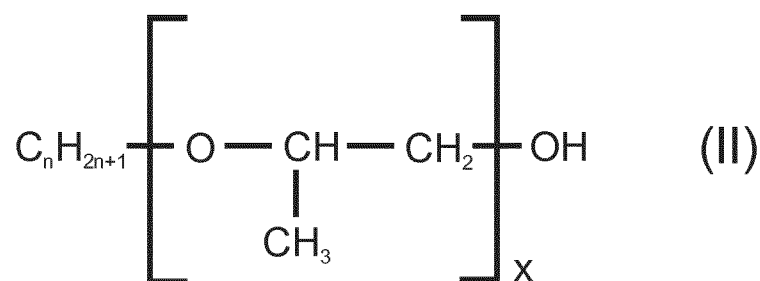
2. Composition according to claim 1 characterized in that the total concentration of the one or more pentaerythritol esters is in the range from 0.05% to 5% by weight calculated to the total composition.

3. Composition according to claim 2 characterized in that the total concentration of the one or more pentaerythritol esters is in the range from 0.1% to 3% by weight calculated to the total composition.

4. Composition according to claim 3 characterized in that the total concentration of the one or more pentaerythritol esters is in the range from 0.15% to 1% by weight calculated to the total composition.

5. Composition according to any of the claims 1 to 4 characterized in that the one or more pentaerythritol esters are selected from pentaerythrityl tetraethylhexanoate, pentaerythrityl tetracaprylate, pentaerythrityl tetranonanoate, pentaerythrityl tetralaurate, pentaerythrityl tetramyristate, pentaerythrityl tetrastearate, pentaerythrityl tetraoleate, pentaerythrityl tetrabehenate, pentaerythrityl tetraisononanoate, pentaerythrityl tetraisostearate and mixtures thereof.

6. Composition according to any of the claims 1 to 5 characterized in that the PPG alkyl ethers are characterized by the following formula (II)



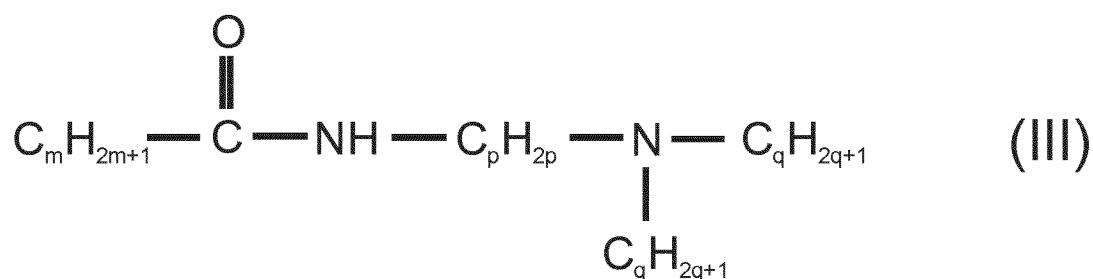
wherein n is an integer in the range from 4 to 8 and x is an integer in the range from 2 to 15.

7. Composition according to any of the claims 1 to 6 characterized in that the total concentration of the one or more PPG alkyl ethers is in the range from 0.05% to 5% by weight calculated to the total composition.

8. Composition according to claim 7 characterized in that the total concentration of the one or more PPG alkyl ethers is in the range from 0.1% to 4% by weight calculated to the total composition.

9. Composition according to claim 8 characterized in that the total concentration of the one or more PPG alkyl ethers is in the range from 0.15% to 2.5% by weight calculated to the total composition.

10. Composition according to any of the claims 1 to 9 characterized in that the composition further comprises one or more amidoamines defined by the formula (III)



wherein m is an integer in the range from 11 to 23, p is an integer in the range from 1 to 4 and q is an integer in the range from 1 to 4.

11. Composition according to claim 10 characterized in that the one or more amidoamines are selected from stearamidopropyl

dimethyl amine, stearamidopropyl diethyl amine, stearamidoethyl diethyl amine, stearamidoethyl dimethyl amine, palmitamidopropyl dimethyl amine, palmitamidopropyl diethyl amine, palmitamidoethyl diethyl amine, palmitamidoethyl dimethyl amine, behenamidopropyl dimethyl amine, behenamidopropyl diethyl amine, behenamidoethyl diethyl amine, behenamidoethyl dimethyl amine, arachidamidopropyl dimethyl amine, arachidamidopropyl diethyl amine, arachidamidoethyl diethyl amine, arachidamidoethyl dimethyl amine and mixtures thereof.

12. Composition according to any of the claims 10 to 11 characterized in that the concentration of the one or more amidoamines in total is in the range of preferably 0.1% to 5% by weight calculated to the total composition.

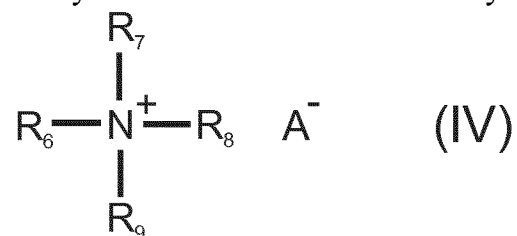
13. Composition according to claim 12 characterized in that the concentration of the one or more amidoamines in total is in the range of preferably 0.25% to 4% by weight calculated to the total composition.

14. Composition according to claim 13 characterized in that the concentration of the one or more amidoamines in total is in the range of preferably 0.4% to 3% by weight calculated to the total composition.

15. Composition according to any of the claims 1 to 14 characterized in that the composition further comprises one or more fatty alcohols of the formula $R_5\text{-OH}$ in which R_5 stands for a saturated or unsaturated, linear or branched hydrocarbon group, wherein the hydrocarbon group comprises 8 to 30 carbon atoms.

16. Composition according to claim 15 characterized in that the total concentration of the one or more fatty alcohols is in the range from 2% to 12% by weight calculated to the total composition.

17. Composition according to any of the claims 1 to 16 characterized in that the composition further comprises one or more quaternary ammonium salts defined by the formula (IV)



wherein R₆ and R₇ stand for a hydrogen atom or an alkyl chain of 1 to 4 carbon atoms which are optionally substituted with one or more hydroxyl groups,

and wherein R₈ stands for a saturated or unsaturated, branched or non-branched alkyl chain of 8 to 24 carbon atoms,

or R₈ stands for R₁₀CON(CH₂)_y group, wherein R₁₀ is a saturated or unsaturated, branched or non-branched alkyl chain with 7 to 21 carbon atoms and y is an integer in the range from 1 to 4,

or R₈ stands for R₁₁COO(CH₂)_z group, wherein R₁₁ stands for a saturated or unsaturated, branched or non-branched alkyl chain with 7 to 21 carbon atoms and z is an integer in the range from 1 to 4,

and wherein R₉ stands for a hydrogen atom or for a saturated or unsaturated, branched or non-branched alkyl chain of 8 to 24 carbon atoms,

or R₉ stands for a R₁₀CON(CH₂)_y or R₁₁COO(CH₂)_z group, wherein

R_{10} , R_{11} , y and z have the same meaning as above,
and A is an anion, preferably chloride or bromide.

18. Composition according to any of the claims 1 to 17 characterized in that the composition further comprises water in a concentration of more than 80% by weight calculated to the total weight of the composition.

19. Composition according to any of the claims 1 to 18 characterized in that the composition is free of silicone oils.

20. Composition according to any of the claims 1 to 19 characterized in that the composition is free from cellulose containing ionic or nonionic polymers.

21. Composition according to any of the claims 1 to 20 characterized in that the composition further comprises a preservative, selected from phenoxyethanol, ethylhexyglycerin methylparaben, ethylparaben, benzyl alcohol, methylisothiazolinone, methylchloroisothiazolinone and/or DMDM hydantoin.

22. Composition according to any of the claims 1 to 21 characterized in that the composition is free from polyquaternium or quaternium polymers.

23. Composition according to any of the claims 1 to 22 characterized in that the composition is free from esters of PPG alkyl ethers or PPG aryl ethers.

24. Composition according to any of the claims 1 to 23 characterized in that the composition is filled and kept in a jar, a bottle, a squeeze bottle, a pump spray or an aerosol can.

25. Composition according to any of the claims 1 to 24 characterized in that citric acid or lactic acid is added to the composition to adjust pH in a range from 3.0 to 6.9.

26. Composition according to any of the claims 1 to 25 characterized in that the composition further comprises one or more cationic, anionic, amphoteric and/or nonionic surfactants.

27. Method of preparing the composition according any of claims 1 to 26, wherein the individual components are mixed in water.

28. Method of conditioning human hair, comprising steps of applying the composition according to any of claims 1 to 26 the hair and optionally rinsing off the composition after its application within 1 to 60 minutes.

29. Use of the composition according to any of claims 1 to 26 to condition human hair, whereby the effect of hair being weighed down by the conditioning agents is reduced.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/056104

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61K8/37 A61K8/86 A61K8/41 A61Q5/12
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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 99/13838 A1 (PROCTER & GAMBLE [US]; UCHIYAMA HIROTAKA [JP]; MIZOGUCHI YUKIKO [JP];) 25 March 1999 (1999-03-25) claims 1-9; examples 1-4 -----	1-29
Y	WO 01/08644 A1 (PROCTER & GAMBLE [US]; VENKATESWARAN ANANTHANARAYAN [JP]; YANG JIAN ZH) 8 February 2001 (2001-02-08) claims 1-14; examples 1,5,8,10 -----	1-29
Y	WO 01/74312 A2 (PROCTER & GAMBLE [US]; SNYDER MICHAEL ALBERT [JP]; OHTSU KUMIKO [JP];) 11 October 2001 (2001-10-11) cited in the application claims 1-19; examples 10,18 ----- -/-	1-29



Further documents are listed in the continuation of Box C.



See patent family annex.

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"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

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"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

19 April 2017

Date of mailing of the international search report

04/05/2017

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/056104

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2003/143174 A1 (ROYCE DOUGLAS ALLAN [US] ET AL) 31 July 2003 (2003-07-31) claims 14-17 -----	1-29
Y	EP 2 138 155 A2 (BEIERSDORF AG [DE]) 30 December 2009 (2009-12-30) cited in the application paragraph [0014] - paragraph [0016]; claims 1-6 -----	1-29

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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