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(54) **Title**: TREATMENT COMPOSITION

(57) **Abstract**: An aerated composition comprising at least 5% by volume of air and/or inert gas at 20°C, a particulate metal compound and a lamellar phase comprising a cationic surfactant and fatty material.

TREATMENT COMPOSITION

Technical Field

This invention relates to aerated cosmetic compositions comprising metal particulates.

Metal particulates are widely used in personal care compositions, for instance zinc salts which are common antidandruff agents.

However compositions comprising such particulate materials appear gritty. Such an appearance makes the product unattractive to consumers, especially in products that are said to condition.

US 2004/0076651 (Wella) discloses a stable cosmetic or dermatological cream in the form of a packaged, ready-prepared foam. It can be a permanently foamed hair-treatment cream. Examples have varying amounts of cationic surfactant and other ingredients, such as alcohol.

Aerated products should not to be confused with suspension of air bubbles in compositions. Such suspended air bubbles are described in WO 2008/079693 (CP Kelco) which discloses a composition comprising cationic surfactant and microfibrous cellulose. The composition described therein may further comprise suspended air bubbles. Such suspended air bubbles within a dominant majority liquid phase are not an aerated or foamed composition according to the present invention.

The present invention has found that aeration of the product reduces the gritty appearance. Aeration of products frequently leads to unstable products, however aerated products of the invention are stable.

Summary of the Invention

According to the present invention there is provided an aerated composition comprising at least 5% by volume of air and/or inert gas at 20°C, a particulate metal compound and a lamellar phase comprising a cationic surfactant and a fatty material.

The invention also relates to a method of treating hair comprising the step of applying to the hair the composition described above.

Detailed Description of the Invention

The compositions of the agents of the invention are foamed with air or inert gas up to a degree of foam-up which typically is at least 5% of air or inert gas at 20°C, preferably 10 percent and up to 100 percent, more preferably between 15 and 70 percent and particularly between 20 and 60% by volume. It is preferred that at least 25% by volume of the product is foamed.

The compositions may be foamed with an inert gas or air, preferably they are foamed with air.

Preferably the aerated compositions do not comprise a hydrocarbon based propellant.

In the context of the present invention the definition of a stable foam is a product characterized in that it has homogeneously distributed a gaseous substance in the form of small gas bubbles which remain in this homogeneous distribution over a period of at least one week, preferably at least one month and particularly at least 6 months if stored at room temperature 20°C.

Preferably, the average bubble size on initial manufacture is from 5 microns in diameter to 100 microns, preferably from 6 microns to 50 microns. It is preferable that the average bubble size is no more than 50 times its initial diameter, preferably no more than 40 times its original diameter after storage at 45°C for 28 days. Preferably the average bubble size after 3 months storage at 45° is 500 microns or less, more preferably 300 microns or less.

Bubble size is based on the number average diameter.

The diameters are measured using an Olympus microscope, camera and associated AnalySIS software.

In the context of the present invention an aerated composition does not comprise a product that is dispersed from an aerosol, or a consumer operated container comprising a valve.

Metal Particulate

Compositions of the invention comprise a metal particulate material.

Preferred metal particulates are transition metals, especially preferred are metal particulates selected from zinc and titanium. It is preferred if the metal particulate is a salt, oxide or complex, zinc salts, oxides or particulates are preferred. Particularly preferred are zinc metal particulates selected from zinc pyrithione, zinc oxide and mixtures thereof. Zinc pyrithione (ZnPTO) which is an alternate name for zinc 1-hydroxy-2-pyridinethione is especially preferred.

The average particulate size of the metal salt is preferably less than 10 microns, more preferably from 0.1 microns to 5 microns.

3The metal particulate is preferably present at a level of from 0.05 to 5 wt.%, preferably from 0.1 to 3 wt.%, more preferably from 0.25 to 2.5 wt.% based on the total weight of the composition.

Cationic Surfactant

Suitable cationic conditioning surfactants can be used singly or in admixture.

Preferably the cationic conditioning surfactant is a quaternary ammonium or an amine having at least one long chain alkyl group that has on average around about 16 to about 30 carbon atoms.

Suitable cationic surfactants for use in hair conditioners of the invention include cetyltrimethylammonium chloride, behenyltrimethylammonium chloride, cetylpyridinium chloride, tetramethylammonium chloride, tetraethylammonium chloride, octyltrimethylammonium chloride, dodecyltrimethylammonium chloride, , octyldimethylbenzylammonium chloride, decyldimethylbenzylammonium chloride, stearyldimethylbenzylammonium chloride, didodecyldimethylammonium chloride, dioctadecyldimethylammonium chloride, tallowtrimethylammonium chloride, cocotrimethylammonium chloride, and the corresponding hydroxides thereof. Further suitable cationic surfactants include those materials having the CTFA designations Quaternium-5, Quaternium-31 and Quaternium-18. Mixtures of any of the foregoing materials may also be suitable.

Preferably the cationic surfactant is insoluble in water. Insoluble in this context is defined as materials which at 20°C do not form isotropic, clear solutions in water at greater than 0.2 Wt%.

Preferred cationic surfactants are moncationic, more preferred surfactants include the compounds distearyldimethylammonium, dicetyldimethylammonium,

tricetylmethylammonium,-behenyltrimethylammonium, stearyl benzyl dimethylammonium, suitable amines include distearylamine, distearylmethylamine,behenylamine, behenylmethylamine, behenyldimethylamine, dicetylamine, dicetylmethylamine, tricetylamine.

Preferably the cationic salt is a combination of behenyltrimethylammonium/salt with a second cationic conditioning surfactant. In the most preferred form the cationic conditioning surfactant is behenyltrimethylammonium salt, in particular the chloride. In compositions of the invention, the level of cationic surfactant is preferably from 0.1 to 10%, more preferably 0.5 to 7%, most preferably 1 to 5% by weight of the total composition.

Fatty material

Conditioners of the invention incorporate a fatty material (8 to 22 carbon atoms), preferred fatty material are fatty alcohol and fatty acid, fatty alcohol is especially preferred The combined use of fatty alcohol materials and cationic surfactants in conditioning compositions is believed to be especially advantageous, because this leads to the formation of a lamellar phase, in which the cationic surfactant is dispersed.

Representative fatty alcohols comprise from 8 to 22 carbon atoms, more preferably 16 to 20. Examples of suitable fatty alcohols include cetyl alcohol, stearyl alcohol and mixtures thereof. The use of these materials is also advantageous in that they contribute to the overall conditioning properties of compositions of the invention.

The level of fatty alcohol material in conditioners of the invention is conveniently from 0.01 to 10%, preferably from 0.1 to 5% by weight of the composition. The weight ratio of cationic surfactant to fatty alcohol is suitably from 10:1 to 1:10, preferably from 4:1 to 1:8, optimally from 1:1 to 1:4.

Silicones

Compositions of the invention may comprise silicones, in particular silicone emulsions.

Suitable silicone emulsions include those formed from silicones such as polydiorganosiloxanes, in particular polydimethylsiloxanes which have the CTFA designation dimethicone, polydimethyl siloxanes having hydroxyl end groups which have the CTFA designation dimethiconol, and amino-functional polydimethyl siloxanes which have the CTFA designation amodimethicone.

The emulsion droplets may typically have a Sauter mean droplet diameter ($D_{3,2}$) in the composition of the invention ranging from 0.01 to 20 micrometer, more preferably from 0.2 to 10 micrometer.

A suitable method for measuring the Sauter mean droplet diameter ($D_{3,2}$) is by laser light scattering using an instrument such as a Malvern Mastersizer.

Suitable silicone emulsions for use in compositions of the invention are available from suppliers of silicones such as Dow Corning and GE Silicones. The use of such pre-formed silicone emulsions is preferred for ease of processing and control of silicone particle size. Such pre-formed silicone emulsions will typically additionally comprise a suitable emulsifier such as an anionic or nonionic emulsifier, or mixture thereof, and may be prepared by a chemical emulsification process such as emulsion polymerisation, or by mechanical emulsification using a high shear mixer. Pre-formed silicone emulsions having a Sauter mean droplet diameter ($D_{3,2}$) of less than 0.15 micrometers are generally termed microemulsions.

Examples of suitable pre-formed silicone emulsions include emulsions DC2-1766, DC2-1784, DC-1785, DC-1786, DC-1788 and microemulsions DC2-1865 and DC2-1870, all available from Dow Corning. These are all emulsions/microemulsions of dimethiconol. Also suitable are amodimethicone emulsions such as DC939 (from Dow Corning) and SME253 (from GE Silicones).

Also suitable are silicone emulsions in which certain types of surface active block copolymers of a high molecular weight have been blended with the silicone emulsion droplets, as described for example in WO03/094874. In such materials, the silicone emulsion droplets are preferably formed from polydiorganosiloxanes such as those described above. One preferred form of the surface active block copolymer is according to the following formula:

$$HO(CH_2CH_2O)_x(\underset{\displaystyle CH_3}{\underset{|}{CH}}CH_2O)_y(CH_2CH_2O)_x\ H$$

wherein the mean value of x is 4 or more and the mean value of y is 25 or more.

Another preferred form of the surface active block copolymer is according to the following formula:

$$(HO(CH_2CH_2O)_a(\underset{\displaystyle CH_3}{\underset{|}{CH}}CH_2O)_b)_2\text{-}N\text{-}CH_2\text{-}CH_2\text{-}N((OCH_2\underset{\displaystyle CH_3}{\underset{|}{CH}})_b(OCHCH_2)_aOH)_2$$

wherein the mean value of a is 2 or more and the mean value of b is 6 or more.

Mixtures of any of the above described silicone emulsions may also be used.

Silicone will generally be present in a composition of the invention at levels of from 0.05 to 10%, preferably 0.05 to 5%, more preferably from 0.5 to 2% by total weight of silicone based on the total weight of the composition.

Further Ingredients

Other ingredients may include viscosity modifiers, preservatives, silicones, colouring agents, polyols such as glycerine and polypropylene glycol, chelating agents such as EDTA, antioxidants such as vitamin E acetate, fragrances, antimicrobials and sunscreens. Each of these ingredients will be present in an amount effective to accomplish its purpose. Generally these optional ingredients are included individually at a level of up to about 5% by weight of the total composition.

Preferably, compositions of this invention also contain adjuvants suitable for hair care. Generally such ingredients are included individually at a level of up to 2%, preferably up to 1%, by weight of the total composition.

Among suitable hair care adjuvants, are:

(i) natural hair root nutrients, such as amino acids and sugars. Examples of suitable amino acids include arginine, cysteine, glutamine, glutamic acid, isoleucine, leucine, methionine, serine and valine, and/or precursors and derivatives thereof. The amino acids may be added singly, in mixtures, or in the form of peptides, e.g. di- and tripeptides. The amino acids may also be added in the form of a protein hydrolysate, such as a keratin or collagen hydrolysate. Suitable sugars are glucose, dextrose and fructose. These may be added singly or in the form of, e.g. fruit extracts.

(ii) hair fibre benefit agents. Examples are:

- ceramides, for moisturising the fibre and maintaining cuticle integrity. Ceramides are available by extraction from natural sources, or as synthetic

ceramides and pseudoceramides. A preferred ceramide is Ceramide II, ex Quest. Mixtures of ceramides may also be suitable, such as Ceramides LS, ex Laboratories Serobiologiques.

- free fatty acids, for cuticle repair and damage prevention. Examples are branched chain fatty acids such as 18-methyleicosanoic acid and other homologues of this series, straight chain fatty acids such as stearic, myristic and palmitic acids, and unsaturated fatty acids such as oleic acid, linoleic acid, linolenic acid and arachidonic acid. A preferred fatty acid is oleic acid. The fatty acids may be added singly, as mixtures, or in the form of blends derived from extracts of, e.g. lanolin.

Mixtures of any of the above active ingredients may also be used.

Structure of composition

The structure of the composition comprises a lamellar structure. It is preferred if the composition does not have a micellar structure.

The composition is an aerated product in that it is packaged in an aerated form.

Mode of Use

The compositions of the invention are primarily intended for topical application to the body, preferably the hair and/or scalp of a human subject in rinse-off or leave-on compositions.

The compositions provided by the invention may be aqueous conditioner compositions, used by massaging them into the hair followed by rinsing with clean water prior to drying the hair.

The invention will be further described by way of the following non-limiting examples.

Examples

A hair conditioner composition was made as specified in Table 1 using the following preparative method.

Table 1- Composition 1

Chemical Name	Tradename	% Active	% w/w Example A	% w/w Example 1	% w/w Example B	% w/w Example C	% w/w Example 2
Methyl-p-hydroxy benzoate	Nipagin M	100.00	0.200	0.200	0.200	0.200	0.200
BTAC	Genamin BTLF	70.00	2.857	2.857	2.857	2.857	2.857
Stearyl Alcohol	Lanette S3	100.00	4.000	4.000	4.000	4.000	4.000
Perfume Hyperion 85J	Perfume Hyperion 85J	100.00	0.600	0.600	0.600	0.600	0.600
Dimethicone/ Amodimethicone /Centrimonium Chloride	DC 5-7 134 9:1 600K/8566 CTAC	70.00	1.428	1.428	1.428	1.428	1.428
Zinc Pyrithione	Zinc Pyrtithione	48.00	0.625	0.625	0	0	0
Zinc oxide	Zinc oxide	100	0	0	0	0	0.625
Water	Water	100.00	to 100	to 100	to 100	to 100	to 100
Post aeration: target %			**0**	**50**	**0**	**50**	**50**

Nipagin M, Gemamin BTLF and Lanette S3 were added gradually to hot water in a mixer with stirring. The mixer was sealed and evacuated until bubbles began to rise. The product was homogenised for 15 minutes, the product was cooled and quench water was added followed by silicone. After further cooling perfume was added. The product was further evacuated and homogenised at 40% for 5 min. ZnPTO or ZnO was then added the base followed by water.

Comparative Examples were prepared as above, but the metal particulate (when present) was added without aeration.

Foam stability

Foam stability was measured using turbiscan measurements. The essence of the turbiscan measurements is that it measures the backscattered light at 135 degrees. The wavelength of the laser used is 880 nm which is Near Infra Red (NIR) region. The intensity of the scattered light depends on the size of the bubbles. The smaller the size the larger the intensity and vice versa. Stable foams have smaller bubbles and hence larger intensity measurements.

The samples were aerated and vials were filled with the aerated conditioner and kept in a storage ovens at 25°C. Foam stability was measured using turbiscan measurements at regular intervals without any intervention. The method is not intrusive and the microstructure (bubble size is not affected by the measurement itself) evolution can be followed in time.

The following charts show the intensity of scattered light over time.

Days	Example B	Example C	Example 1	Example 2
0	37.03	61.65	71.56	77.34
1	36.02	56.07	60.12	60.46
7	36.95	47.17	54.75	55.44
14	37.17	42.98	53.76	53.55
28	36.99	40.64	50.71	51.65
42	37.21	39.34	50.26	50.98
56	37.43	38.80	51.08	50.35

The results show that the products according to the invention have higher intensity scores and hence smaller bubbles and thus were more stable than aerated comparative example C.

Figure 1 demonstrates an aerated product and non-aerated product according to Examples 1 and A. It can be seen that the zinc particulates are obvious in Example A, but can not be seen in Example 1 .

CLAIMS

1. An aerated composition comprising at least 5% by volume of air and/or inert gas at 20°C, a particulate metal compound and a lamellar phase comprising a cationic surfactant and fatty material.

2. A composition according to claim 1 in which the particulate metal compound is a zinc salt.

3. A composition according to claim 2 in which the particulate metal salt is zinc pyrithione or zinc oxide.

4. A composition according to claim 2 in which the particulate zinc salt is zinc pyrithione (Zn PTO).

5. A composition according to any preceding claim that is foamed with air.

6. A composition according to any preceding claim in which the volume of air and/or inert gas at 20°C is from 15 % to 70 %.

7. A composition according to any preceding claim comprising bubbles, the bubbles having an initial average diameter size from 5 to 100 microns.

8. A composition according to any preceding claim in which the average bubble size after 3 months storage at 45°C is 300 microns or less.

9. A composition according to any preceding claim in which the cationic surfactant is insoluble in water at 20°C.

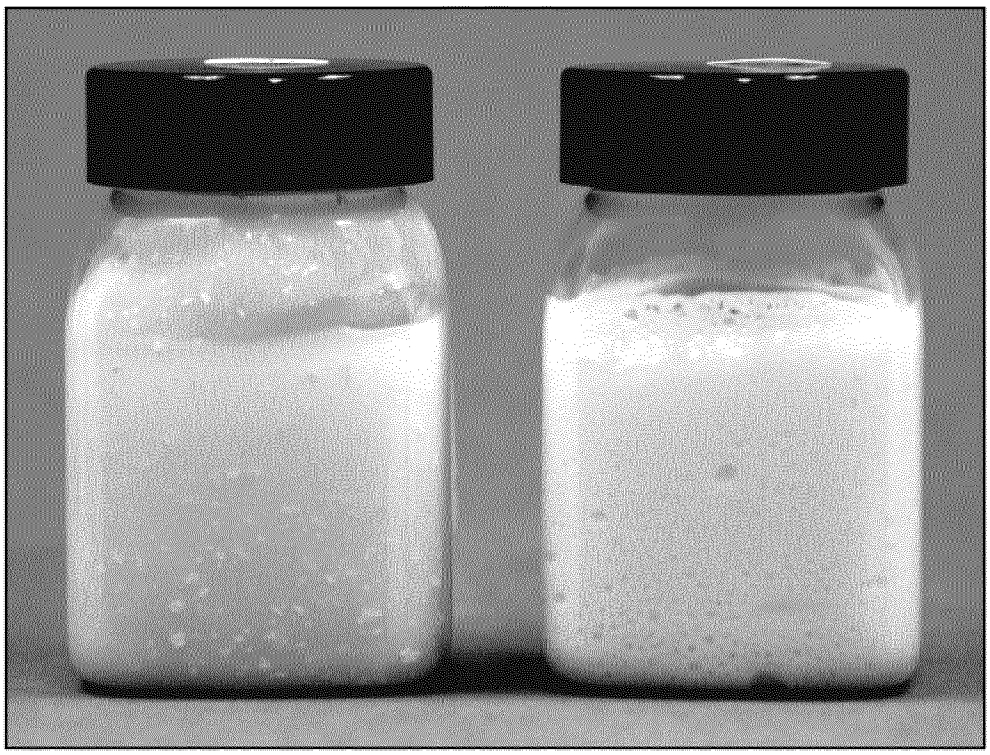
10. A composition according to any preceding claim in which the cationic surfactant comprises a derivative of quaternary ammonium or an amine having at least one long chain alkyl group has had on average around about 16 to about 30 carbon atoms.

11. A composition according to claim 10 in which the cationic surfactant is behenyltrimethylammonium or salt thereof.

12. A composition according to any preceding claim which further comprise fatty alcohol, fatty acid or mixtures thereof.

13. A method of treating hair comprising the step of applying to the hair the composition described in any of the preceding claims.

Fig. 1



Example A Example 1