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(54) **Title**: METHOD OF TREATING HAIR

(57) **Abstract**: A method of straightening the hair comprising the step of applying to the hair a hair treatment composition comprising: i) at least 0.4 wt% of the total composition of a sugar alcohol; and ii) at least 0.4 wt % of the total composition of a bi or tridentate carboxylic acid in which the ratio of sugar alcohol to acid is 1:5 to 5:1; and iii) heating the resulting composition to a temperature of greater than 120°C for at least 10 seconds.



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METHOD OF TREATING HAIR

The invention relates to a method of hair straightening.

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The current hair market has a wide range of straightening products. A common way to retain a particular hairstyle is by applying a hairspray, mousses, gel, lotions or wax. The materials in these compositions are generally film forming agents, resins, gums, and/or adhesive polymers. Generally these formulations do not
10 straighten the hair from wash to wash.

Permanent hair straightening compositions that are on the market are based on chemical treatment of the hair in a two-step process using thiol- or hydroxide-based reducing agents followed by a neutralisation or oxidation step. Such
15 systems have various negatives associated with them; in that the process itself is difficult to conduct, in many instances this straightening process is undertaken by a qualified hairdresser in a professional salon. Furthermore the straightening process damages the hair, has an unpleasant odor and can cause irritation to the scalp.

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WO2007/047251 discloses styling/straightening compositions containing isomalt;

The present invention has now found that hair can be straightened in a way that mitigates damage, yet remains straight/ has reduced volume even after
25 subsequent washing.

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Summary of Invention

The present invention relates to a method of straightening the hair comprising the step of applying to the hair a hair treatment composition comprising:

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- i) at least 0.4 wt% of the total composition of a sugar alcohol; and
- ii) at least 0.4 wt % of the total composition of a bi or tridentate carboxylic acid in which the ratio of sugar alcohol to acid is 1:5 to 5:1; and
- 10 iii) heating the resulting composition to a temperature of greater than 120°C for at least 10 seconds.

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Description of Invention

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The composition of the invention comprise a sugar alcohol, preferably the sugar alcohol comprises mannitol and/or sorbitol, more preferably the sugar alcohol is a mono or disaccharide disaccharide. Particularly preferred are isomalt and/or sorbitol. Isomalt is a combination of 1-O-• -D-glucopyranosido-D-mannitol and 6-O-• -D-glucopyranosido-D-sorbitol.

20

The level of sugar alcohol in the total composition is preferably from 0.4 to 7.9 wt% preferably, more preferably from 1 wt% to 7 wt% of the total composition, most preferably from 1.5 to 6 wt%.

25

Compositions of the invention comprise a bidentate or tridentate organic acids. Preferably the organic acid is a di or tri carboxylic acid, more preferably the carboxylic cid is a short chain (C2-C10, preferably C3 to C6)) carboxylic acids,

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especially preferred are di or tri acid carboxylic acid, citric acid being particularly preferred.

5 The bi or tridentate carboxylic acid is present in the total composition at a level of at least 0.4 wt%, more preferably at a level greater than 0.9 wt%, most preferably at a level from 1 to 5 wt%.

The ratio of sugar alcohol to bi.tridentate carboxylic acid is from 1:5 to 5:1, more preferably from 1:3 to 3:1.

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Hair care compositions of the present invention can comprise a carrier, or a mixture of such carriers, which are suitable for application to the hair. The carriers are present at from about 0.5% to about 99.5%, preferably from about 5.0% to about 99.5%, more preferably from about 10.0% to about 98.0%, of the composition. As used herein, the phrase "suitable for application to hair" means that the carrier does not damage or negatively affect the aesthetics of hair or cause irritation to the underlying skin.

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Compositions according to the invention comprise a buffer or pH adjuster.

20 Preferred buffers or pH adjusters include weak acids and bases such as glycine/sodium hydroxide, lactic acid, succinic acid, acetic acid and salts thereof. Frequently a mixture of buffering system. Preferably the pH is 4 or below. More preferably the pH is from 2.5 to 3.5.

25 Compositions according to the invention are preferably aqueous compositions intended to be applied to the hair after shampooing and rinsing. They are massaged into preferably dry hair and, heating, preferably followed by further rinsing with water prior to drying the hair. By aqueous composition, it is meant that the compositions of the invention comprise 60% by weight or more of water, preferably 70% or more, more preferably 80% or more.

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When the hair care composition is a hair spray, tonic, gel, or mousse the preferred solvents include water, ethanol, volatile silicone derivatives, and mixtures thereof. The solvents used in such mixtures may be miscible or immiscible with each other. Mousses and aerosol hair sprays can also utilise any of the conventional
5 propellants to deliver the material as a foam (in the case of a mousse) or as a fine, uniform spray (in the case of an aerosol hair spray). Examples of suitable propellants include materials such as trichlorofluoromethane, dichlorodifluoromethane, difluoroethane, dimethylether, propane, n-butane or isobutane. A tonic or hair spray product having a low viscosity may also utilise an
10 emulsifying agent. Examples of suitable emulsifying agents include nonionic, cationic, anionic surfactants, or mixtures thereof. If such an emulsifying agent is used, it is preferably present at a level of from about 0.01% to about 7.5% by weight based on total weight of the composition. The level of propellant can be adjusted as desired but is generally from about 3% to about 30% by weight based
15 on total weight for mousse compositions and from about 15% to about 50% by weight based on total weight for aerosol hair spray compositions.

Hair styling creams or gels also typically contain a structurant or thickener, typically in an amount of from 0.01% to 10% by weight.

20 Suitable spray containers are well known in the art and include conventional, non-aerosol pump sprays i.e., "atomisers", aerosol containers or cans having propellant, as described above, and also pump aerosol containers utilising compressed air as the propellant.

25 The formulation may include conditioning materials such as surfactants, cationic conditioners suitable for hair, quaternary silicone polymers, silicone based conditioners and their emulsions, and amino functional silicones and their emulsions.

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Further general ingredients suitable for all product forms include, sun-screening agents, anti-dandruff actives, carboxylic acid polymer thickeners and emulsifiers for emulsifying the various carrier components of the compositions of the invention.

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In some aspects of this invention it is highly desirable if the composition comprises a styling aid. Particularly useful as styling aids with this invention are hair styling polymers. Hair styling polymers are well known articles of commerce and many such polymers are available commercially which contain moieties which render the polymers cationic, anionic, amphoteric or nonionic in nature. The polymers may be synthetic or naturally derived.

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The amount of the hair styling polymer may range from 0.1 to 10%, preferably 0.5 to 8 %, more preferably 0.75 to 6% by weight based on total weight of the composition.

15

The compositions of the present invention may also contain adjuncts suitable for hair care. Generally such ingredients are included individually at a level of up to 2, preferably up to 1 wt% of the total composition. Suitable hair care adjuncts, include amino acids, sugars and ceramides.

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The method of the invention comprises applying compositions of the invention followed by a heating step. The hair should be heated to a temperature above 120°C, more preferably above 150°C, most preferably above 170°C. It is preferable if the maximum temperature applied to the hair is 220°C.

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The following non-limiting Examples further illustrate the preferred embodiments of the invention. All percentages referred to in the examples and throughout this specification are by weight based on total weight unless otherwise indicated.

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Examples

Dark brown European wavy#6 switches of length ~25 cm and weight 2gms, were dosed with 1ml each of 4% citric acid (4%C); 4% sorbitol (4%S), 2% citric acid + 2% sorbitol (2%C+2%S), 4% isomalt (4%I), 2% citric acid + 2% isomalt (2%C+2%I) solutions. Control switches were treated with water. They were left to dry at 50°C for at least 30 minutes. When dry the switches were straightened 7 times with irons (set at 180°C). The switches were washed with Sunsilk (Fresh & Flowing) twice for 30 secs each time. They were left to dry overnight at 20°C & 50%RH. The switches were combed 5 times and pictures taken. The volume and length of switches are measures of the straightness of the treated switches. (Here volume refers to the projection of the switch image on to the screen and is given in mm²).

Treatment	Volume in mm²	% Volume reduction compared to water	Length in mm	%Length benefit compared to water²
water	13932	0.0	199.5	0.0
4%C	9948	28.6	214.2	7.3
4%S	14359	-3.1	202.8	1.7
4%I	15882	-14.0	209.2	4.8
2%C+2%I	7812	43.9	215.0	7.8
2%C+2%S	9562	31.4	220.0	10.3

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From the table it can be seen that the combination of citric acid and the sugar gives benefits over and above the single active alone either in terms of volume or length. This demonstrates that the invention gives long lasting straightness benefits even after 1 wash.

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CLAIMS

1. A method of straightening the hair comprising the step of applying to the hair
5 a hair treatment composition comprising:
 - i) at least 0.4 wt% of the total composition of a sugar alcohol; and
 - ii) at least 0.4 wt % of the total composition of a bi or tridentate carboxylic
10 acid in which the ratio of sugar alcohol to acid is 1:5 to 5:1; and
 - iii) heating the resulting composition to a temperature of greater than 120°C for at least 10 seconds.
- 15 2. A method according to claim 1 in which the sugar alcohol is a monosaccharide or disaccharide.
3. A method according to claim 2 in which the sugar alcohol is sorbitol and/or isomalt.
- 20 4. A method according to any preceding claim in which the carboxylic acid is a short chain (C2-C6) carboxylic acid.
5. A method according to any preceding claim in which the carboxylic acid is a
25 di or tri acid carboxylic acid.
6. A method according to any preceding claim in which the carboxylic acid is citric acid.
- 30 7. A method according to any preceding claim in which the level of sugar alcohol is from 1.5 to 6 wt% of the total composition.

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8. A method according to any preceding claim in which the level of short chain carboxylic acid is greater than 0.9 wt% of the total composition.
- 5 9. A method according to any preceding claim in which the pH of the composition is 4 or below at 20°C.
10. A method according to the previous claim in which the pH of the composition is from 2.5 to 3.5 at 20°C.
- 10 11. A method according to any preceding claim in which the hair is heated to a temperature above 150°C.
12. A method according to any preceding hair in which the composition is not
15 washed off between application of the composition and the heating process.
13. A method according to claim 11 in which the composition is left on the hair for a minimum of 10 minutes before application of heat.
- 20 14. A method according to any preceding claim in which the composition is applied to dry hair.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/060102

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61K8/365 A61K8/60 A61Q5/04
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, 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 2009/047251 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]; UNILEVER HINDUSTAN [IN]; BROWNBIL) 16 April 2009 (2009-04-16) the whole document -----	1-14
Y	WO 2010/049434 A2 (OREAL [FR]; DIXON FELICIA [US]; PISTORIO BRADFORD [US]; ELLINGTON ANGE) 6 May 2010 (2010-05-06) the whole document -----	1-14
A	WO 2005/025524 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]; LEVER HINDUSTAN LTD [IN]; TIWARI) 24 March 2005 (2005-03-24) the whole document -----	1
A	WO 2010/141098 A1 (ZERRAN INTERNAT CORP; SAUTE ROBERT [US]; SAUTE STEVE [US]) 9 December 2010 (2010-12-09) the whole document -----	1



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

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"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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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