FORM 1

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

628991

APPLICATION FOR A STANDARD PATENT

I\We,

UNILEVER PLC

of UNILEVER HOUSE
BLACKFRIARS
LONDON EC4
ENGLAND

hereby apply for the grant of a standard patent for an invention entitled:

SHAMPOO COMPOSITION

which is described in the accompanying complete specification

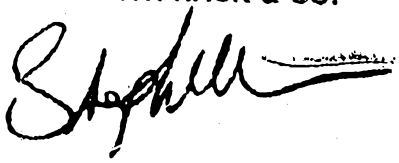
Details of basic application(s):

Number of basic application	Name of Convention country in which basic application was filed	Date of basic application
8913880	GB	16 JUN 89

My/our address for service is care of ~~GRIFFITH HACK & CO., Patent Attorneys, 601 St. Kilda Road, Melbourne 3004, Victoria, Australia.~~ Unilever Australia Limited C/- Mr B.F. Jones Private Bag 2, Epping NSW 2121

DATED this 13th day of June 1990

UNILEVER PLC
GRIFFITH HACK & CO.



TO: The Commissioner of Patents.

ADDRESS FOR SERVICE ALTERED

J3112 B

AUSTRALIA

PATENTS ACT 1952

APPLICATION BY ASSIGNEE OF INVENTOR

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

NAME OF APPLICANT

In support of an application made by:

UNILEVER PLC

TITLE

for a patent for an invention entitled:

SHAMPOO COMPOSITION

FULL NAME AND ADDRESS OF SIGNATORY

I, Dilshad RAJAN

of Unilever House, Blackfriars, London

EC4P 4BQ, England

do solemnly and sincerely declare as follows:

1. I am authorised by the above mentioned applicant for the patent to make this declaration on its behalf.

FULL NAME AND ADDRESS OF INVENTOR(S)

2. The name and address of each actual inventor of the invention is as follows:

Peter GALLAGHER OF 1 Mission Cottage (off Moss Lane), Burscough, Lancashire, England; and Thomas McGEE of 74 Stanley Road, Hoylake, Wirral, Merseyside L47 LH2, England

SEE NOTES OVER

3. The facts upon which the applicant is entitled to make this application are as follows:

The Applicant would be entitled to have assigned to it a patent granted to any of the actual inventors in respect od said invention

DELETE PARAGRAPHS 3 AND 4 FOR NON-CONVENTION APPLICATION

4. The basic application(s) as defined by Section 141 of the Act was (were) made as follows:

Country Great Britain on 16 June 1989

in the name(s) UNILEVER PLC

and in on

in the name(s)

PLACE AND DATE OF SIGNING

5. The basic application(s) referred to in the preceding paragraph was (were) the first application(s) made in a Convention country in respect of the invention the subject of this application.

Declared at London, England

this 14th day of June 1990

Signed

Position

Authorised Signatory

GRIFFITH HACK & CO

PATENT AND TRADE MARK ATTORNEYS

MELBOURNE · SYDNEY · PERTH

(12) PATENT ABRIDGMENT (11) Document No. AU-B-57071/90
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No 628991

(54) Title
SHAMPOO COMPOSITION

(51)[5] International Patent Classification(s)
A61K 007/075

(21) Application No. : **57071/90** (22) Application Date : **13.06.90**

(30) Priority Data

(31) Number (32) Date (33) Country
8913880 **16.06.89** **GB UNITED KINGDOM**

(43) Publication Date : **20.12.90**

(44) Publication Date of Accepted Application : **24.09.92**

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(56) Prior Art Documents
US 4824865

(57) Claim

1. An aqueous shampoo composition comprising:

(a) from 0.1 to 20% by weight of a 2-hydroxyalkanoic acid chosen from 2-hydroxyhexanoic acid, 2-hydroxyoctanoic acid, 2-hydroxydecanoic acid or mixtures thereof;

(b) from 2 to 40% by weight of surfactant, at least the majority of which is anionic, amphoteric and/or zwitterionic; and

(c) from 0.1 to 10% by weight of a co-acid buffering agent.

AUSTRALIA

628991

PATENTS ACT 1952

Form 10

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

Short Title:

Int. Cl:

Application Number:
Lodged:

Complete Specification-Lodged:
Accepted:
Lapsed:
Published:

Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

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Complete Specification for the invention entitled:
SHAMPOO COMPOSITION

The following statement is a full description of this invention including the best method of performing it known to me:-

SHAMPOO COMPOSITION

FIELD OF INVENTION

The invention relates to shampoo compositions containing 2-hydroxyalkanoic acids.

BACKGROUND OF THE INVENTION

Certain 2-hydroxyalkanoic acids are known for their skin benefits when included in compositions for topical application to the skin. Such benefits include both increased extensibility and improved appearance.

Hair which has reduced elasticity, as a result of ageing or of chemical or mechanical treatment regimes is more likely to fracture when subjected to mechanical stress. By increasing hair elasticity, the hair becomes not only more resistant to such stress, but also more appealing cosmetically. The hair feels softer and is less flyaway.

Hydroxycarboxylic acids have previously been included in skin creams where they have been shown to give some benefit in the treatment of various skin disorders. Examples of such skin creams can be found in US 3 920 835, US 3 984 566 or US 4 363 815, all in the names of Van Scott and Yu.

Skin creams containing a combination of 2-hydroxyoctanoic acid and alkyl lactate are disclosed in US 4 507 319 (Unilver), and are said to be particularly effective against acne.

EP 7785 (Unilever) relates to skin compositions containing hydroxylated C_6 to C_{10} carboxylic acids which can be formulated with a number of vehicles including anionic emulsifiers. These compositions contain no co-acid buffer to maintain an acid pH.

The use of 2-hydroxy octanoic acid in the treatment of dandruff and of excessively dry scalp with defective hair growth is disclosed in EP 232 982 (Unilever), in which the acid is applied to the hair in a composition which also comprises nonionic surfactant. Nonionic surfactant is preferred in those applications to minimise exacerbation of the skin conditions.

DE 2 110 993 (Henkel) relates to liquid cleaning compositions which comprise alkali metal salts of hydroxycarboxylic acids. These compositions contain no co-acid butter to maintain an acid pH.

It has now been found surprisingly that when certain 2-hydroxyalkanoic acids are incorporated into shampoo

compositions, they increase the elasticity of the hair, thus producing a cosmetic benefit. This effect builds up over subsequent applications of the 2-hydroxyalkanoic acid.

The effect can be seen on application of 2 hydroxy alkanoic acids of chain length C_4 to C_{20}.

BRIEF SUMMARY OF THE INVENTION

The invention provides a shampoo composition comprising

(a) from 0.1 to 20% by weight of a 2-hydroxyalkanoic acid chosen from 2-hydroxyhexanoic acid, 2-hydroxyoctanoic acid, 2-hydroxydecanoic acid or mixtures thereof;

(b) from 2 to 40% by weight of surfactant, at least a major proportion of which is anionic, amphoteric and/or zwitterionic; and

(c) from 0.1 to 10% by weight of a co-acid buffering agent.

A minor proportion of the surfactant might be a co-surfactant from another class such as a nonionic surfactant.

It is particularly envisaged that forms of the invention will have 2 to 40% anionic surfactant, possibly acccompanied by other surfactant.

DETAILED DESCRIPTION OF THE INVENTION

The 2-hydroxyalkanoic acid

The shampoo composition of the invention contains from 0.1 to 20% by weight, preferably from 1 to 10% by weight of a 2-hydroxyalkanoic acid, chosen from 2-hydroxyhexanoic acid, 2-hydroxyoctanoic acid, 2-hydroxydecanoic acid or mixtures thereof. The most preferred acid is 2-hydroxyoctanoic acid.

If less than 0.1% by weight of 2-hydroxyalkanoic acid is included in the composition, no increase in elasticity of the hair is observed, and if more than 20% by weight is included, no added benefit is seen.

Surfactant

The shampoo composition of the invention also comprises from 2 to 40% by weight, preferably 5 to 20% by weight, of surfactant, all or a majority of which is anionic, amphoteric or zwitterionic. In particular there may be at least 2% of anionic (so that the quantity of anionic is in the range 2 to 40%) possibly accompanied by surfactant from another class. Anionic surfactant may constitute the majority proportion of the surfactant present.

An anionic surfactant is preferably chosen from acyl glutamates, acyl peptides, sarcosinates, ester carboxylic acids, acyl isethionates, α-olefin sulphonates, sulphosuccinates, alkyl benzene sulphonates, amides of N-

methyl taurine, α-sulpho fatty acids, alkyl sulphates such as sodium, magnesium or ammonium lauryl sulphate and alkyl ether sulphates, and is most preferably sodium lauryl ether sulphate (2EO).

Amphoteric and zwitterionic surfactants which may be used, especially as a co-surfactant in conjunction with anionic surfactant, include alkyl betaines, alkyl amido propyl betaines, alkyl ampho glycinates and sulphobetaines (sultaines).

Nonionic surfactants which may be present, but only as a minor proportion of the surfactant mixture, include ethoxylates for example of alcohols, sugar esters, esters of glycols, esters of glycerol, ethoxylated sorbitan esters and amine oxides.

Co-acid buffering agent

The composition also comprises a co-acid buffering agent which acts to maintain an acid pH. We have found that the hair can buffer a weak solution of 2-hydroxyalkanoic acid giving rise to the salt of the acid, which has a lower penetration than the acid itself.

Suitable co-acid buffering agents include lactic acid, citric acid, tartaric acid, acetic acid, formic acid, malonic acid, glycolic acid, thioglycollic acid, benzoic acid, adipic acid, malic acid and mesaconic acid. The most preferred acid is lactic acid.

The co-acid buffering agent is present in the

composition in an amount of 0.1 to 10%, preferably at least 1%, more preferably from 2 to 5% by weight. The total of 2-hydroxyalkanoic acid buffering agent will frequently be at least 1.7% better at least 3 or 5% by weight of the composition.

The pH of the composition is preferably in the range of from 3 to 5.

Other ingredients

The shampoo composition of the invention may also further comprise a deposition agent which aids deposition of the 2-hydroxy alkanoic acid onto the hair. The deposition agent is preferably present in the composition in an amount from 0.01 to 5% by weight, more preferably present in an amount from 0.5 to 3% by weight.

Suitable deposition agents include the cationic cellulose ethers described in US Patent Nos. 3 816 616 and 4 272 515 and which are available commerically from Union Carbide Corporation as Polymer JR. Polymer JR has the CTFA designation Polyquaternium 10. Other suitable materials are the cationic polygalactomannan gum derivatives described in US Patent No. 4 298 494 which are commercially available under the trade mark Jaguar from Celanese-Stein Hall. An example of a suitable material has the CTFA designation guar hydroxypropyltrimonium chloride and is available under the name Jaguar C13S. Other suitable materials include that known as Jaguar C17 and Jaguar C16 which is hydroxypropylated cationic guar

derivative containing hydroxypropyl substituent groups as well as cationic quaternary ammonium groups.

Other deposition agents useful in the shampoos of the present invention include cationic polyamide polymers such as the low molecular weight adipic acid/diethylene-triamine polyamide and the copolymers of vinylpyrrolidone and dimethylaminoethyl methacrylate quaternised with dimethyl sulphate (Gafquat 755, GAF Corporation) described in US Patent No. 4 080 310; the graft cationic copolymer containing N-vinylpyrrolidone, dimethylamonoethyl methacrylate and polyethylene glycol described in US Patent No. 4 048 301; the mineral acid salts of the amono-alkyl esters of homo- and copolymers of unsaturated carboxylic acids having from 3 to 5 carbon atoms described in US Patent No. 4 009 256; and the polymers of etherified starch described in US Patent No. 3 186 911.

The high molecular weight polymers sold under the trade mark Merquat by Merck & Co. Inc., are also suitable for use as deposition agents in the present shampoos. Representative ones are Merquat 100, a highly charged cationic dimethyldiallylammonium chloride homopolymer, and Merquat 550, a highly charged cationic copolymer prepared with dimethyldiallylammonium chloride and acrylamide. These materials are designated in the CFTA dictionary as Quaternium-40 and Quaternium-41, respectively.

The shampoo composition of the invention comprises also certain ingredients known in the art and necessary to the particular formulation. Examples of other ingredients include surfactants, viscosity control agents, solubility control agents, foam boosters, opacifiers, perfumes, colouring agents, conditioning agents such as silicones,

preservatives, proteins, polymers, buffering agents and water.

PROCESS

The shampoo composition of the invention is formulated by mixing together the required ingredients in the amounts specified.

PRODUCT FORMS AND PACKAGING

The shampoo composition of the invention is commonly packaged in a bottle with lid or a dispenser with a pump. In general, the composition of the invention may be formulated in any manner that allows application to the hair so that the benefit conferred by the 2-hydroxyalkanoic acid on the hair is discernible. Possible packaging variants are those known to the man skilled in the field of hair treatment compositions.

ADVANTAGES OF THE INVENTION

The shampoo composition of the invention has been shown in tests involving Instron measurements of hair elasticity to increase the elasticity of hair significantly at the 95% confidence level. Although applicant does not wish to be bound by theory, it is thought that there exists a correlation between the increase in elasticity of hair when treated with compositions of the invention and the degree of plasticisation of the hair protein chains. Pulsed NMR measurements confirm that plasticisation in hair treated with a composition containing a 2-hydroxyalkanoic acid is greater than in untreated hair. The effect is particularly marked in the case of hair that has been damaged chemically or mechanically.

Hair with increased elasticity tends to break less easily under mechanical stress such as brushing or combing. Negroid hair that has been treated with the composition of the invention becomes softer, more pliable, and more fracture-resistant than untreated hair. European and Thai hair show improved elasticity.

COMPARATIVE EXAMPLES

The following comparative examples illustrate the effect of 2-hydroxyalkanoic acid retention on hair properties.

Comparative Example 1

Hair switches were immersed in a 1% by weight aqueous solution of 2-hydroxyoctanoic acid (pH 3.0) for 24 hours. The hair: liquor ratio was 1:200 by weight. Instron tests showed that the increase in elasticity resulting from treatment with the 2-hydroxyoctanoic acid was statistically significant at the 95% confidence level as compared to virgin, untreated hair.

Comparative Example 2

Switches of Thai hair were soaked for 24 hours in 0.0625M solutions of 2-hydroxy alkanoic acids having chain lengths of C_2, C_6, C_8 and C_{14}, in a hair to liquor ratio of 1:200. The C_{14} hydroxy acid is sparingly soluble in water so an ethanolic solution was used. Control results were obtained by soaking hair switches in water or ethanol (as control for C_{14}) for 24 hours.

It was found that all of the acids tested increase the elasticity of the hair with the 2-hydroxy octanoic acid giving the optimum effect.

Comparative Example 3

This comparative example illustrates the effect of a co-acid buffer on retention of 2-hydroxyalkanoic acid.

Hair switches were treated with a composition containing 1% radiolabelled 2-hydroxyoctanoic acid and 2% lactic acid at a pH of 3.0. After several applications, the degree of retention of the 2-hydroxyoctanoic acid by the hair was measured and was found to be greater than for hair treated with a similar composition containing no lactic acid.

This demonstrates that 2-hydroxyalkanoic acid retention by the hair is enhanced in the presence of a co-acid buffer.

Comparative Example 4

Hair switches (0.5g, 10 cm long) were washed. A test composition, containing varying levels of 2-hydroxyoctanoic acid and lactic acid as set out below, was applied to each switch, left for one minute, and the switch was rinsed for 30 seconds. The 2-hydroxyoctanoic acid was radiolabelled with ^{14}C so that the amount of 2-hydroxyoctanoic acid retained on the hair could be assesed.

The switch was blown dry, shampooed with a different composition (lacking 2-hydroxyalkanoic acid) and the test composition reapplied. The level of radioactivity retained on the hair was measured after 1, 5 and 10 such treatments.

The test compositions all had a pH of 3 and contained:-

A. 1% by weight 2-hydroxyoctanoic acid
B. 1% by weight 2-hydroxyoctanoic acid and 2% by weight lactic acid
C. 2% by weight 2-hydroxyoctanoic acid and 4% by weight lactic acid

The results were as follows. The measurements are given as g of 2-hydroxyoctanoic acid ($x10^{-4}$) retained per g of hair.

	g/g hair ($x10^{-4}$)		
No. applications	A	B	C
1	2.15	3.03	-
5	3.12	7.55	16.5
10	4.08	11.1	-

It can be seen that the level of 2-hydroxyoctanoic acid which is retained on the hair is significantly enhanced by the addition of lactic acid.

The following Examples illustrates shampoo compositions according to the invention. The ingredients are mixed together to form the shampoo, and the pH of each of the compositions is adjusted to 3.0 to 5.0 using base.

Example 1

	% wt
SLES 2EO	9.0
Empilan CDE (1)	2.0
Hydroxyoctanoic acid	5.0
Lactic acid	1.0
Colour, perfume, preservative	qs
Water	to 100

(1) Empilan CDE is cocodiethanolamide

Example 2

	%wt
Dialkylsulphosuccinate	9.5
Urea	15.0
Hydroxyhexanoic acid	5.5
Acetic acid	1.7
Butane-1, 3-diol	2.5
Water	to 100

Example 3

	%wt
Alpha-olefin sulphonate	8.5
Glucamate DOE 120 (2)	4.5
Hydroxydecanoic acid	0.4
Lactic acid	1.3
Colour, perfume, preservative	qs
Water	to 100

(2) Glutamate DOE 120 is ethoxylated methyl glucoside dioleate.

Example 4

	%wt
DOBS 102 (3)	10.0
Glucamate DOE 120	4.5
Hydroxyoctanoic acid	3.0
Lactic acid	2.0
Colour, perfume, preservative	qs
Water	to 100

(3) DOBS 102 is C_{12} - C_{14} alkyl benzene sulphonate

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An aqueous shampoo composition comprising:

(a) from 0.1 to 20% by weight of a 2-hydroxyalkanoic acid chosen from 2-hydroxyhexanoic acid, 2-hydroxyoctanoic acid, 2-hydroxydecanoic acid or mixtures thereof;

(b) from 2 to 40% by weight of surfactant, at least the majority of which is anionic, amphoteric and/or zwitterionic; and

(c) from 0.1 to 10% by weight of a co-acid buffering agent.

2. An aqueous shampoo composition as claimed in Claim 1 wherein the 2-hydroxyalkanoic acid is 2-hydroxyoctanoic acid.

3. An aqueous shampoo composition as claimed in Claim 1 or Claim 2 wherein the 2-hydroxyalkanoic acid is present in an amount from 1 to 10% by weight.

4. An aqueous shampoo composition according to claim 1, claim 2 or claim 3 containing 2 to 40% by weight anionic surfactant.

5. An aqueous shampoo composition as claimed in claim 4 wherein the anionic surfactant is chosen from acyl glutamates, acyl peptides, sarcosinates, ester carboxylic acids, acyl isethionates, α-olefin sulphonates,

sulphosuccinates, alkyl sulphates, or alkyl ether sulphates, alkyl aryl sulphonates, amides of N-methyl taurine or α-sulpho fatty acids.

6. An aqueous shampoo composition as claimed in claim 4 wherein the anionic surfactant is chosen from acyl glutamates, acyl peptides, sarcosinates, ester carboxylic acids, acyl isethionates, α-olefin sulphonates, sulphosuccinates, alkyl sulphates or alkyl ether sulphates.

7. An aqueous shampoo composition as claimed in claim 4, wherein the anionic surfactant is chosen from sodium lauryl ether sulphate 2EO or sodium lauryl sulphate 3EO.

8. An aqueous shampoo composition according to any one of the preceding claims wherein the surfactant further comprises a surfactant chosen from alkyl betaines, alkyl amido propyl betaines, alkyl ampho glycinates, sulphobetaines, nonionic ethoxylates, sugar esters, esters of glycols, esters of glycerol, ethoxylated sorbitan esters or amine oxides.

9. An aqueous shampoo composition as claimed in any preceding claim, wherein the co-acid buffering agent is lactic acid.

10. An aqueous shampoo composition as claimed in any preceding claim wherein the co-acid buffering agent is present in an amount from 2 to 5% by weight.

11. An aqueous shampoo composition as claimed in any of the preceding claims, further comprising a deposition agent in an amount from 0.01 to 5% by weight.

12. An aqueous shampoo composition as claimed in claim 11, wherein the deposition agent is chosen from Polyquaternium 10, Quaternium 40, Quaternium 41 and guar hydroxypropyltrimonium chloride.

13. An aqueous shampoo composition as claimed in claim 11 or claim 12, wherein the deposition agent is present in an amount from 0.5 to 3% by weight.

14. An aqueous shampoo composition according to any one of the preceding claims wherein the total of 2-hydroxyalkanoic acid and co-acid buffering agent is at least 3% by weight of the composition.

15. A method of enhancing the elasticity of hair which comprises shampooing the hair with a composition according to any one of the preceding claims.

DATED THIS 13TH DAY OF JUNE 1990
UNILEVER PLC
By its Patent Attorneys:
~~GRIFFITH HACK & CO.~~, Unilever Australia Limited
Fellows Institute of Patent
Attorneys of Australia