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2,930,761

HAIR CLEANSING COMPOSITION

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2 Claims. (Cl. 252—152)

This invention relates to materials and methods for cleansing the hair and particularly to compositions containing ditertiary diamines and their use.

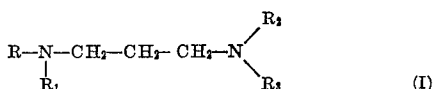
Anionic surface-active products such as alkyl-aryl-sulphonates and alkyl-sulphates, as usually employed for cleansing the hair have the advantage of being good detergents and having good foaming power. On the other hand, they have the disadvantage that they remove from the hair natural fatty substances to which it owes its flexibility and its lustre, and they thus render it "dry" and brittle. They are generally employed in an alkaline medium and cannot be used in a neutral or acid medium. These products do not act as "softeners," this term being used in the sense in which it is usually employed in textile fibre treatment, that is to say, they do not facilitate the sliding of the hairs one upon the other and do not facilitate the application of dyes.

It is also known that some non-ionic surface-active products can be employed for cleansing the hair. Such products are also good detergents and have good foaming power. They are free from some of the disadvantages of anionic products, but they also have no "softening" effect on the surface of the hair.

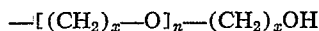
Some cationic surface-active products, such as quaternary ammonium salts and long-chain aliphatic amine salts, have also been proposed as products for cleansing the hair. They are generally rather poor detergents and they have the disadvantage of being noxious to the scalp. On the other hand, they have good "softening" properties, which also promote dyeing.

It has now been discovered, however, that certain ditertiary aliphatic diamines substantially afford all the advantages required of a product for cleansing hair.

According to a first feature of the present invention there are provided compositions for use in cleansing the hair which comprise aqueous dispersions or solutions of at least one ditertiary aliphatic diamine of the general Formula I:



wherein R represents a saturated or unsaturated straight or branched aliphatic group containing from 12 to 22 carbon atoms, two of the groups R_1 , R_2 and R_3 represent groups of the formula $-(CH_2)_x-OH$ and the other represents a group of the formula



where x is 2 or 3 and n is nought or 1, or salt of such diamine, the composition having a pH of 3.5 to 6.

According to a further feature of the invention a process of cleansing hair comprises applying thereto an aqueous composition as defined above.

In practice, compounds of Formula I are preferably used in the form of aqueous solutions or aqueous sols of their salts, as will hereinafter be explained in greater

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detail, and in each particular case either an individual salt or a mixture of salts corresponding to a mixture of compounds of Formula I will be used in this form.

The compounds of Formula I have both cationic and non-ionic properties. Their cationic activity is low by reason of the presence of the hydroxyethyl groups attached to the nitrogen atom.

They can be prepared from fatty amines or mixtures of fatty amines by the following process:

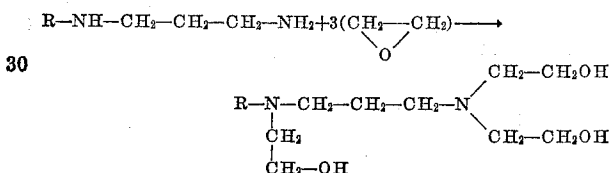
(1) A molecule of alkylamine $R-NH_2$ is condensed with a molecule of acrylic nitrile to obtain the corresponding alkyl-amino-propionitrile in accordance with the reaction:



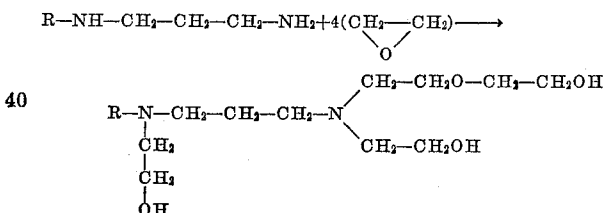
(2) The alkyl-amino-propionitrile is converted into alkyl-amino-propylamine by catalytic hydrogenation in accordance with the reaction:



(3) Three or four molecules of ethylene oxide or propylene oxide are attached to one molecule of the alkylamino-propylamine by the conventional method of fixing ethylene oxide or propylene oxide on amines in accordance with the reactions (shown for ethylene oxide):



or:



It is necessary to ensure that the three hydrogen atoms fixed on the two nitrogen atoms of the alkylaminopropylamine are substituted by the group $-(CH_2)_x-OH$ or $-[(CH_2)_x-O]_n -(CH_2)_x-OH$, so as to obtain solely tertiary amine groups, and thus to eliminate completely the noxious action of secondary or primary amine groups on the epidermis. It is for this reason that it is advantageous to fix at least three molecules of ethylene oxide or propylene oxide on one molecule of alkylaminopropylamine without, however, exceeding four molecules. If four molecules are exceeded, the foaming power of the salts of the hydroxyethylated or hydroxypropylated alkylaminopropylamine is decreased.

Excellent products are obtained which have very high foaming power and are completely harmless to the skin by fixing, for example, an average of 3.5 molecules of ethylene oxide or propylene oxide on 1 molecule of alkylaminopropylamine.

The alkylaminopropylamines thus hydroxyethylated or hydroxypropylated are not soluble in water, but they can be dispersed in water. On the other hand, the majority of their salts are soluble in water.

Salts of the compounds of Formula I can be formed with various mineral or organic acids. Mineral acids such as hydrochloric acid or phosphoric acid may be employed. However, it is preferred to employ salts formed from fatty acids of low molecular weight such as formic

acid, acetic acid and propionic acid, from hydroxy-acids of low molecular weight such as glycolic acid, lactic acid and glyceric acid, from dibasic acid of low molecular weight such as malonic acid and succinic acid, or from hydroxy polybasic acids of low molecular weight such as maleic acid, tartaric acid or citric acid.

The aforesaid acids are mentioned only by way of example. Any acid giving water-soluble salts with the compounds of Formula I may be employed. However, it will be advantageous to employ acids which are most compatible with the skin, notably hydroxy acids, such as lactic acid, which in addition gives an unctuous foam.

For preparing solutions ready for use, one or more compounds of Formula I heated at 70–80° C., are neutralised by adding with good agitation, an aqueous solution heated at the same temperature of the acid employed. The pH of the solution obtained may range from 3.5 to 6, depending upon the acid employed. Solutions of salts having a more acid pH lose some of their foaming power, and those with more alkaline pH lead to hydrolysis of the salts and deposition of cationic base. It is advantageous to adjust the pH to between 3.5 and 5 by slowly adding the solution of the acid and controlling the pH thereof. After neutralisation, the solution is allowed to cool before being perfumed, if desired, and before being packed.

It is an advantage of the salts of compounds of Formula I that in many cases, at normal temperature, they form more or less viscous liquids or gels which liquefy on heating, depending upon their concentration. These liquids and gels constitute suitable compositions according to the invention. Thus, an aqueous solution containing 50% by weight of the dilactate of a compound of Formula I in which R has a chain length of 18 carbon atoms (oleyl or stearyl) is fluid at 60° C. On cooling to below 50° C., it sets in the form of a plastic, homogeneous gel. Such a gel can be packed in tubes and used without any addition of gelling or thickening agent. On the other hand, an aqueous solution containing 30% by weight of the said dilactate remains fluid and limpid at room temperature and can be marketed in liquid form.

Shampoos prepared with solutions of salts of compounds of Formula I give an abundant and consistent lather. The detergent action is such that all dirt on the hair is eliminated at the first wash and rinsing is simple. Owing to the fact that they are both cationic and non-ionic, the salts of compounds of Formula I are insensitive to acid pH and to the alkaline-earth metal salts contained in the washing water. No deposition emanating from the product itself or from an action of the product on salts contained in the water takes place on the hair.

Moreover, it appears that, probably owing to their low cationic activity, the salts of compounds of Formula I are not completely eliminated from the surface of the hair on rinsing but leave a layer of molecular proportions resistant to rinsing. The following are the principal advantages of the products prepared in accordance with the invention:

(i) After washing and rinsing, the hair has an extremely glossy appearance and a remarkable lustre.
(ii) It is particularly soft to the touch and can be combed and disentangled without effort as if it were lubricated.

(iii) Setting and permanent waving are easier to carry out and "hold" better, the hair appearing to have more "spring" than after washing with the shampoos usually employed.

(iv) Like all detergents having more or less pronounced cationic properties, the products defined in the present invention promote the development of dyes on the hair.

(v) The layer of molecular dimensions deposited on the surface of the hair reverses the static electric charge of the latter which, instead of attracting dust, then tends

to repel it. The hair becomes anti-static and less readily takes up dust in suspension in the air.

The following examples will serve to illustrate the invention:

EXAMPLE I

Dilactate of N-hydroxyethyl-N'-di-(hydroxyethyl)-oleylamino-propylamine in fluid aqueous solution

Ethylene oxide is reacted with 1 gram molecule of oleylamino-propylamine, i.e. 324 g., until the weight is increased by 132 g.

To the 456 g. of N-hydroxyethyl-N'-di-(hydroxyethyl)-oleylamino-propylamine thus obtained, heated at 75° C., there is slowly added with agitation a solution of 225 g. of 80% lactic acid in 1430 g. of water, heated at 60° C. The pH is adjusted to 6.0.

On cooling, a limpid 30% solution of N-hydroxyethyl-N'-di-(hydroxyethyl)-oleylamino-propylamine lactate is obtained. This solution can be directly used as a liquid shampoo.

EXAMPLE II

Dilactate of N-hydroxyethyl-N'-hydroxyethyl-N'-(hydroxyethoxyethyl)alkyl-(tallow)-amino-propylamine, in the form of a paste

Four molecules of ethylene oxide are reacted with one molecule, i.e. 320 g. of alkylamino-propylamine (the alkyl chain corresponding to the mixture of the chains of the fatty acids derived from tallow), until the weight is increased by 176 g.

To the 496 g. of product thus obtained, heated at 80° C., is slowly added with agitation a solution of 225 g. of 80% lactic acid in 631 g. of water, the solution having been heated to 80° C.

The solution is allowed to cool and a consistent and translucent gel is obtained, which can be directly employed as a concentrated shampoo.

EXAMPLE III

A 30% clear aqueous solution of N-hydroxyethyl-N'-di-(hydroxyethyl)-oleylamino-propylamine dilactate was prepared as described in Example I.

An effective shampoo with pH 4.2 is obtained with the following ingredients:

	Parts
30% solution of the aforesaid dilactate	92
Hydrochloric acid (22° Bé.)	2
Water to make up 100 parts.	

EXAMPLE IV

A solution effective for washing hair and having a pH of 4 is prepared from:

	Parts
N-hydroxyethyl-N'-di-(hydroxyethyl)-oleylamino-propylamine (in the form of the base)	26
Hydrochloric acid (22° Bé.)	10.5
Water to make up 100 parts.	

I claim:

1. A composition for cleansing live human hair comprising an aqueous solution of the dilactate of N-hydroxyethyl-N'-di-(hydroxyethyl)-oleylamino-propylamine of pH 3.5 to 6.

2. A composition for cleansing live human hair comprising an aqueous solution of the dilactate of N-hydroxyethyl-N'-di-(hydroxy-ethoxyethyl)-alkyl propylamine wherein the alkyl group is derived from the fatty acids of tallow, said solution having a pH of 3.5 to 6.

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