

1

2,928,772

HAIR CONDITIONING COMPOSITION CONTAINING N (HIGHER ACYL COLAMINO FORMYLMETHYL)PYRIDINIUM CHLORIDE AND A FATTY ACIDS MONOGLYCERIDE SULFATE ANIONIC DETERGENT

Albin Fritjof Anderson, Allendale, N.J., assignor to Colgate-Palmolive Company, Jersey City, N.J., a corporation of Delaware

No Drawing. Application October 4, 1954
Serial No. 460,239

5 Claims. (Cl. 167—87)

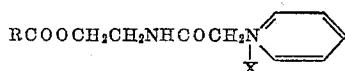
This invention relates to novel compositions for conditioning human hair, and more particularly to compositions obtained by mixing of certain cationic detergents with non-soap anionic detergents.

There have been discovered and developed many shampoo compositions, some based on soaps and more recently others containing synthetic detergents. In general the synthetic detergent products have met with greater consumer acceptance because they wash the hair more completely than mild soaps and so leave it glossier and more attractive after shampooing.

However this very advantage has concomitant disadvantages because the hair, being cleaned more thoroughly, loses its suppleness and hence often becomes difficult to comb after the shampoo. When combed it does not hold its place well, soon becoming disheveled and needing recombining.

The present invention is a new composition which has the ability to condition hair, especially coarse hair, and so make it relax more readily to take the formation and waves desired by the wearer and to remain in place for longer periods of time, obviating the necessity for frequent combing. The invented composition also allows one to comb human hair with greater facility when it is applied thereto. It is ideally suited for application during or after the shampoo.

The novel compositions of the present invention comprise the products obtained by mixing non-soap anionic organic detergents with compounds of the formula



where RCO is a fatty acid radical of from 12 to 18 carbon atoms and X is either chlorine or bromine, preferably chlorine.

Among the suitable anionic compounds that may be used are the aliphatic sulfated or sulfonated detergents. Included in that group are acyl-containing compounds wherein the acyl radical has about 8 to 22 carbon atoms, and more particularly the aliphatic carboxylic ester type, containing 12 to 22 carbon atoms to the molecule. Suitable examples of these aliphatic detergents are the sulfuric acid esters of polyhydric alcohols incompletely esterified with higher fatty acids, either saturated or unsaturated, particularly those whose acyl groups contain from 12 to 18 carbon atoms, e.g. coconut oil monoglyceride monosulfate, hydrogenated coconut oil monoglyceride monosulfate, tallow diglyceride monosulfate, lauroyl monoglyceride monosulfate; the long chain pure or mixed higher alkyl sulfates, e.g. lauryl sulfate, cetyl sulfate, higher fatty alcohol sulfates derived from hydrogenated or nonhydrogenated coconut oil or tallow fatty acids; the higher fatty acid esters of hydroxy alkyl sulfonic acids, e.g. higher fatty acid esters of 2,3 dihydroxy propane sulfonic acid; higher fatty acid amides of amino alkyl sulfonic acids, e.g. the oleic acid amide of amino

2

methyl sulfonic acid, the lauric acid amide of taurine, and the like.

Other appropriate, aliphatic sulf(on)ates include fatty sulfoacetates, e.g. coconut fatty alcohol sulfoacetates; sulfated fatty acyl monoethanolamides, e.g. sulfated lauroyl monoethanolamide; fatty sulfoacetamides, e.g. lauryl sulfoacetamide; lower alkyl sulfosuccinates, e.g. dioctyl sulfo-succinate; sulf(on)ated fatty oils such as sulf(on)ated castor oil and sulf(on)ated red oil.

In addition the higher alkyl or acyl substituted amino acids, e.g. N-lauroyl sarcosine, are anionic detergents contemplated as ingredients of the composition of this invention. Also included are the alkylphenol polyglycol ether sulfates, e.g. the lauryl phenol polyglycol ether sulfates containing three moles ethylene oxide per mole.

The alkyl aryl sulfonates may also be used as the non-soap anionic detergent although not usually preferred in shampoos because of their excessive drying power. Typical of this class of compounds are the higher alkyl aromatic sulfonates where the nucleus may be derived from benzene, toluene, xylene, phenol, cresols, naphthalene, etc. The number of sulfonic groups may vary but generally these compounds contain one such configuration only. The alkyl substituents may be branched or straight chain, such as decyl, dodecyl, keryl, hexadecyl, mixed long-chain alkyls derived from long-chain fatty materials, cracked paraffin wax olefins, polymers of lower mono-olefins, etc. Examples of the class are the higher alkyl mononuclear aryl sulfonates wherein the alkyl group contains 8 to 22 carbon atoms, and preferably about 12 to 18.

The various anionic detergents listed above are to be used in the form of their water soluble or water dispersible salts such as the amine, alkali metal and alkaline earth metal salts. While the sodium, potassium, magnesium salts and the like may be employed, when clear or transparent products are desired it is generally preferred to use the ammonium and amine (including alkyl-amine) salts because of their generally greater solubility in aqueous media. More particularly it is preferred to use the ammonium, monoethanolamine, diethanolamine, triethanolamine salts and mixtures thereof because of the excellent cleansing results obtained through their use particularly when these salts are those of the higher fatty acids monoglyceride sulfuric acids and higher alkyl sulfuric acids (including mixtures thereof).

The cationic compounds that may be used in forming the reaction mixture of this invention are N(lauroyl colamino formylmethyl)pyridinium chloride and its homologues. In such compounds the lauroyl group may be replaced by other fatty acyl radicals of between 13 and 18 carbon atoms, or mixtures of the pyridinium compounds containing such acyl radicals may be employed as the cationic ingredient. A bromine atom may replace the chlorine of the named cationic compounds.

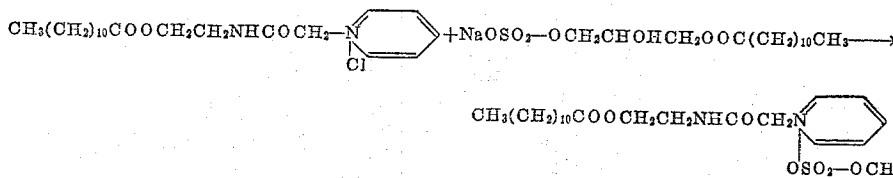
The hair conditioning compositions of this invention may be formulated using stoichiometric or various other proportions of at least one anionic detergent and at least one of the named cationic detergents. The said detergents may be reacted at room temperatures or at other temperatures in the liquid state or in solution, in which latter case the solvents used may be water or organic media, such as low molecular weight alcohols, or mixtures thereof.

The conditioning agents so made may be mixed with detergents, incorporated in shampoos, creams, wave sets, permanent waving compositions, rinses, sprays, oils and other hair dressings and preparations. They may be left on the hair after application or may be washed off, rinsed or otherwise treated; it is preferred in the usual application that the non-substantive excess should be removed by rinsing.

3

It has been observed, when the compounds of this invention are applied to the hair, and it is preferred that such application be made by the consumer through his or her use of a shampoo preparation containing the product or products of this invention, that the hair becomes more manageable and easier to comb, whether wet or dry. After combing it remains in place noticeably better than it does in the absence of the conditioning agent or agents of this invention. The effects of the invented hair conditioners are especially pronounced when used by people with coarse, difficultly manageable hair, and naturally the improvement due to the application of the conditioning agents of this invention is most noticeable after a shampoo, since the act of shampooing, as is well known, makes hair very hard to control.

The mechanism of the reaction, of the products that are the subject of this invention, with the hair is not completely understood at present but it is believed to be dependent upon the presence of a reaction product and its sorption by or deposition upon the hair, said reaction product being the result of a chemical reaction between the anionic detergent and the certain cationic compound in which reaction the reagents are combined and the hydrophylic groups eliminated. for example:



However it must be kept in mind that the identity of the reaction product, if any, is not known at present due to the difficulty of analyzing such materials and therefore in this specification it will be considered a mixture.

The discovery of the advantageous properties of the invented product was an unexpected one, the mixing of anionic and cationic detergents having for long been intentionally avoided by those skilled in the art because of the loss of foaming power and deterative effective encountered thereon. That disadvantage has, until now, prevented the use of such mixtures in shampoos since they were not believed to possess any compensating favorable characteristics.

However now that it has been discovered that a minor amount of a mixture of anionic detergent with a certain cationic compound possesses pronounced hair conditioning activity, and since this is a very desirable property, it is believed that the slight decrease in foaming power, noted when relatively small amounts of the mixture are incorporated in shampoos, will not be a significant deterrent in the future because of the overbalancing advantage of improved hair conditioning effects gained.

It has been found that, in a preferred form of this invention, a shampoo preparation, the invented mixture can be made in situ while formulating the shampoo, by adding for example, the cationic detergent in solution or suspension to the desired amount of anionic detergent, and then compounding with water, perfumes, coloring agents, thickeners, opacifiers, optical brighteners, foaming agents, sequestrants, solvents etc. as desired. A finished shampoo may thus be made containing the product of this invention, without the necessity of isolating, filtering, washing and purifying the invented product or mixture.

It is also possible to mix the anionic detergent and specified cationic compound and add the resulting product to shampoo compositions comprising either anionic or non-ionic detergents useful as shampoo active ingredients.

While in the best mode of this invention, a shampoo composition, the hair conditioning substance will be made by mixing approximately 15-10 parts by weight of the specified cationic detergent with about 85-90 parts of anionic detergent, the sum thereof being 100 parts, this

4

invention is of the products of anionic-cationic detergent mixtures of all proportions effective for hair conditioning, particularly those where the anionic/cationic detergent ratios are between 20:1 and 3:1. Similarly, although normally the shampoo preparation formula will contain ten to thirty-five percent, preferably ten to twenty percent, of anionic organic detergent as formulated, it is not intended that the invention should be so limited as to exclude the use of shampoos of other concentrations.

It has been discovered that if the amount of cationic detergent used is between $\frac{1}{20}$ and $\frac{1}{3}$ the weight of anionic detergent, and preferably between $\frac{1}{20}$ and $\frac{1}{3}$ that amount, the shampoo preparations containing from 10 to 35 percent anionic organic detergent and from 5 to 20 percent low molecular weight alcohol (this term defines ethanol or isopropanol) will be clear, the product of the reaction of the detergents, if any, being in solution or very well dispersed. Such a shampoo preparation does not stratify or separate on standing nor does it become cloudy, thereby detracting from its appearance. So far as is known such clear products are obtained only when the particular cationic detergents of this invention are mixed with anionic organic detergents.

It is possible that not all ratios of specified cationic detergent to anionic detergent will, throughout the entire 10 to 35 percent anionic detergent solids range specified above, give a clear product in aqueous solution containing any percentage of alcohol between 5 and 20. However in the ranges disclosed it is within the ability of one skilled in the art to formulate for optimum clarity, and hair conditioning effectiveness. A clear shampoo possesses a distinct merchandising advantage but it must be realized that those products of this invention which does not disperse readily or are cloudy in appearance nevertheless find use in thicker shampoos including solid, cream, paste and gel shampoos and other hair preparations, a list of which may be found earlier in this specification.

In the manufacture of liquid shampoos it has been observed that the anionic detergent should comprise 10-35% of the shampoo and to prevent formation of non-dispersible precipitates the cationic detergent preferably constitutes between about $\frac{1}{2}$ percent and 7 percent of the final shampoo composition.

The following examples are given for purposes of illustration only and are not to be regarded as limiting the scope of this invention.

Example 1

	Parts by weight
Ammonium salt of sulfated monoglyceride of coconut oil fatty acids (38.8% solution ¹ containing approx. 20% ethyl alcohol and 41.2% water) --	54.1
N(lauroyl colamino formylmethyl)pyridinium chloride -----	2.0
Deionized water -----	43.9
Perfume -----	q.s.

¹ The 38.8% solids indicated comprises approximately 82% detergent solids (active ingredient), 7-10% of ether soluble materials and 7-10% of inorganic sulfates consisting mostly of sodium and ammonium sulfates.

The pyridinium compound was dissolved in water and to that solution at room temperature was added, with stirring, the ammonium salt solution, after which the preparation was perfumed. It was found that this product exhibited definite conditioning action on coarse hair, making it easily combed into formations desired by the wearer. Such conditioning characteristics were lacking in

a similar preparation made without the pyridinium compound.

Example 2

	Parts by weight
(1) Ammonium salt of sulfated monoglyceride of coconut oil fatty acids (36.7% solution ¹ containing approximately 20% ethyl alcohol and 43.3% water) -----	57.2
(2) N(lauroyl colamino formyl methyl)pyridinium chloride -----	3.0
(3) Lauroyl diethanolamide -----	5.0
(4) Deionized water -----	34.8
(5) Perfume -----	q.s

¹The solids composition is the same as that shown in Example 1.

The pyridinium compound was dissolved in water. The lauroyl diethanolamide was dispersed in the anionic detergent solution and the dispersion was added to the solution of pyridinium compound, the mixture being stirred constantly, after which the shampoo was perfumed. Tests run on the living hair of human subjects showed that improved conditioning effects resulted when the above formula was used, compared to results of the use of the same composition lacking the N(lauroyl colamino formyl methyl) pyridinium chloride ingredient.

The shampoo compositions made by the methods of either Example 1 or Example 2 were stable solutions, non-settling and transparent.

In the above specification and the following claims where the word manageability is used it denotes the ability of human hair to be combed, and shaped into a desired formation and to retain such position. Conditioning is defined as improving the manageability of hair.

For conciseness and clarity of expression, the term "detergent" or "detergent solids" where used without further modification is to be construed as inclusive of all the non-soap anionic, cationic and non-ionic detergents which were originally incorporated in the formula, whether or not any of them might, after formulation, no longer be classifiable as detergents due to possible chemical reactions. The term does not include inorganic compounds, free fatty acids or unreacted or incompletely reacted detergent raw materials, all of which are often associated with the active detergent in commercial products.

Likewise the term "anionic detergent" includes the entire formula weight of non-soap anionic detergent, and a similar rule applies to "cationic detergent."

The above invention has been described in conjunction with illustrative examples thereof. It will be obvious to those skilled in the art who read this specification that other variations and modifications of the invention can be made and various equivalents substituted therein with-

out departing from the principles disclosed or going outside the scope of the specification or purview of the claims.

Having thus described the invention, what is claimed is:

1. A clear liquid shampoo composition comprising by weight approximately 10 to 35 percent of a fatty acids monoglyceride sulfate, the acyl radicals of which contain from 12 to 18 carbon atoms and the sulfuric acid group thereof being neutralized by a compound selected from the group consisting of ammonia and amine to make a highly water soluble detergent salt, and between ½ and 7 percent N(higher acyl colamino formylmethyl)pyridinium chloride, the acyl radical of which contains from 12 to 18 carbon atoms, and an aqueous medium.
2. A clear liquid shampoo composition having hair conditioning properties comprising by weight approximately 10 to 35 percent of an ammonium coconut oil fatty acids monoglyceride sulfate and between ½ and 7 percent N(lauroyl colamino formylmethyl)pyridinium chloride, and an aqueous medium.
3. A clear liquid shampoo composition having hair conditioning properties comprising by weight approximately 10 to 20 percent of an ammonium coconut oil fatty acids monoglyceride sulfate and from 2 to 3 percent N(lauroyl colamino formylmethyl)pyridinium chloride, and an aqueous alcoholic medium.
4. A clear liquid shampoo composition having hair conditioning properties comprising by weight approximately from 10 to 35 percent an ammonium coconut oil fatty acids monoglyceride sulfate, ½ to 7 percent N-(lauroyl colamino formylmethyl)pyridinium chloride, 5 to 20 percent lower molecular weight alcohol, and water.
5. A clear liquid shampoo composition having hair conditioning properties comprising by weight from 10 to 20 percent of the ammonium salt of the monosulfuric ester of a coconut oil fatty acids monoglyceride, 2 to 3 percent N(lauroyl colamino formylmethyl)pyridinium chloride, 5 to 20 percent ethanol, and water.

References Cited in the file of this patent

UNITED STATES PATENTS

2,189,664	Katzman -----	Feb. 6, 1940
2,543,061	Rider -----	Feb. 27, 1951
2,614,060	Rogers -----	Oct. 14, 1952

FOREIGN PATENTS

278,403	Switzerland -----	Jan. 16, 1952
810,847	France -----	Mar. 31, 1937
1,029,221	France -----	June 1, 1953

OTHER REFERENCES

Gonon: La Parfumerie Moderne, vol. 40, No. 11, December 1948, pp. 42-49.