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HYDROXYALKYL PIPERIDINE OR PYRROLIDINE OXIDES

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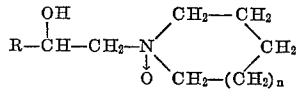
U.S. Cl. 260—294.7 4 Claims

ABSTRACT OF THE DISCLOSURE

Hydroxy higher alkyl piperidine or pyrrolidine oxides, and formulations containing the same. The compounds have many beneficial effects in detergent and cosmetic compositions, particularly desirable for application to the skin and for modification of foaming power of detergent compositions.

This invention relates to heterocyclic N-oxides.

One aspect of this relates to heterocyclic N-oxides of the formula



where R is a long chain alkyl group of at least six carbon atom, e.g. 6 to 20, preferably 10 to 14, carbon atoms and *n* is zero or one.

It has been found that the compounds of this invention have beneficial and unusual characteristics, particularly suitable, for example, in cosmetic and detergent applications.

The compounds described above may be prepared by reacting a long chain 1,2 epoxide with piperidine or pyrrolidine followed by the conversion of the resulting N-2-hydroxyalkyl piperidine or pyrrolidine to the corresponding N-oxide by oxidation, as with hydrogen peroxide.

Examples of 2-hydroxyalkyl groups are 2-hydroxydodecyl, 2-hydroxyoctadecyl, 2-hydroxynonyl, 2-hydroxydecyl, 2-hydroxyundecyl, 2-hydroxytridecyl, 2-hydroxytetradecyl, 2-hydroxypentadecyl, 2-hydroxyhexadecyl, and 2-hydroxylheptadecyl. Mixtures of compounds of different 2-hydroxyalkyl groups may be employed (e.g. a mixture in which these groups have 12–16 carbon atoms).

The compounds of this invention have many desirable attributes of particular value in emulsification and cleansing and detergency. The use of the compositions of the invention gives desirable modifications of the foaming power and/or foam characteristics of detergent compositions, such as a foam boosting effect. By using the new compounds valuable compositions intended for application to the skin or hair (or for use in contact with the skin) with good effects thereon may be formulated. This invention also provides novel compounds which may be formulated into aqueous compositions which remain stable over a satisfactory temperature range.

The novel compounds may be employed in detergent compositions, including light-duty liquids, heavy duty highly-built liquids, and granular compositions in which they may, for example, be post-added to spray-dried built detergent powders. In such detergent compositions they may be mixed with polymeric materials including agents for preventing redeposition of soil, such as sodium carboxymethylcellulose or polyvinyl alcohol; opacifiers; perfumes; anti-tarnishing agents; bacteriostatic agents; and oxygen- and chlorine-releasing bleaches. The novel compounds may also be used in hair-shampooing, hair-dyeing, or other hair-treating or hair-conditioning compositions. The novel compounds may be incorporated in a variety of cosmetic compositions, including such compositions intended for application to the skin as skin lotions, creams, gels, or clear liquids.

In the use of the novel hydroxyalkyl heterocyclic N-oxides of this invention in detergent compositions, the new compound may be used alone or may be added to any of the conventional surface-active detergents. These may be of the anionic, non-ionic, cationic or amphoteric types, or mixtures thereof.

The anionic surface active agents include those surface active or detergent compounds which contain an organic hydrophobic group and an anionic solubilizing group. Typical examples of anionic solubilizing groups are sulfonate, sulfate, carboxylate, phosphonate and phosphate. Examples of suitable anionic detergents which fall within the scope of the invention include the soaps, such as the water-soluble salts of higher fatty acids or rosin acids, such as may be derived from fats, oils and waxes of animal, vegetable or marine origin, e.g. the sodium soaps of tallow, grease, coconut oil, tall oil and mixtures thereof; and the sulfated and sulfonated synthetic detergents, particularly those having about 8 to 26, and preferably about 12 to 22, carbon atoms to the molecule.

As examples of suitable synthetic anionic detergents there may be cited the higher alkyl mononuclear aromatic sulfonates such as the higher alkyl benzene sulfonates containing from 10 to 16 carbon atoms in the alkyl group in a straight or branched chain, e.g., the sodium salts of higher alkyl benzene sulfonates or of the higher alkyl toluene, xylene and phenol sulfonates; alkyl naphthalene sulfonate, ammonium diamyl naphthalene sulfonate, and sodium dinonyl naphthalene sulfonate. In one preferred type of composition there is used a linear alkyl benzene sulfonate having a high content of 3- (or higher) phenyl isomers and a correspondingly low content (well below 50%) of 2- (or lower) phenyl isomers; in other terminology, the benzene ring is preferably attached in large part at the 3 or higher (e.g. 4, 5, 6 or 7) position of the alkyl group and the content of isomers in which the benzene ring is attached at the 2 or 1 position is correspondingly low. Particularly preferred materials are set forth in U.S. Pat. 3,320,174, May 16, 1967, of J. Rubinfeld.

Other anionic detergents are the olefin sulfonates, including long chain alkene sulfonates, long chain hydroxyalkane sulfonates or mixtures of alkenesulfonates and hydroxyalkanesulfonates. These olefin sulfonate detergents may be prepared, in known manner, by the reaction of SO_3 with long chain olefins (of 8–25, preferably 12–21 carbon atoms) of the formula $RCH{=}CHR_1$, where R is alkyl and R_1 is alkyl or hydrogen, to produce a mixture of sultones and alkenesulfonic acids, which mixture is then treated to convert the sultones to sulfonates. Examples of other sulfate or sulfonate detergents are paraffin sulfonates, such as the reaction products of alpha olefins and bisulfites (e.g. sodium bisulfite), e.g. primary paraffin sulfonates of about 10–20, preferably about 15–20, carbon atoms; sulfates of higher alcohols; salts of α-sulfofatty esters (e.g. of about 10 to 20 carbon atoms, such as methyl α-sulfomyristate or α-sulfotallowate).

Examples of sulfates of higher alcohols are sodium lauryl sulfate, sodium tallow alcohol sulfate. Turkey Red Oil or other sulfated oils, or sulfates of mono- or diglycerides of fatty acids (e.g. stearic monoglyceride monosulfate), alkyl poly (ethenoxy) ether sulfates such as the sulfates of the condensation products of ethylene oxide and lauryl alcohol (usually having 1 to 5 ethenoxy groups per molecule); lauryl or other higher alkyl glyceryl ether sulfonates; aromatic poly (ethenoxy) ether sulfates such as the sulfates of the condensation products of ethylene

oxide and nonyl phenol (usually having 1 to 6 oxyethylene groups per molecule).

The suitable anionic detergents include also the acyl sarcosinates (e.g. sodium lauroylsarcosinate) the acyl esters (e.g. oleic acid ester) of isethionates, and the acyl N-methyl taurides (e.g. potassium N-methyl lauroyl- or oleyl tauride).

The most highly preferred water soluble anionic detergent compounds are the ammonium and substituted ammonium (such as mono-, di- and triethanolamine), alkali metal (such as sodium and potassium) and alkaline earth metal (such as calcium and magnesium) salts of the higher alkyl benzene sulfonates, olefin sulfonates, the higher alkyl sulfates, and the higher fatty acid monoglyceride sulfates. The particular salt will be suitably selected depending upon the particular formulation and the proportions therein.

Nonionic surface active agents include those surface active or detergent compounds which contain an organic hydrophobic group and a hydrophilic group which is a reaction product of a solubilizing group such as carboxylate, hydroxyl, amido or amino with ethylene oxide or with the polyhydration product thereof, polyethylene glycol.

As examples of nonionic surface active agents which may be used there may be noted the condensation products of alkyl phenols with ethylene oxide, e.g., the reaction product of isooctyl phenol with about 6 to 30 ethylene oxide units; condensation products of alkyl thiophenols with 10 to 15 ethylene oxide units; condensation products of higher fatty alcohols such as tridecyl alcohol with ethylene oxide; ethylene oxide addends of monoesters of hexahydric alcohols and inner ethers thereof such as sorbitan monolaurate, sorbitol mono-oleate and mannitan monopalmitate, and the condensation products of polypropylene glycol with ethylene oxide.

Cationic surface active agents may also be employed. Such agents are those surface active detergent compounds which contain an organic hydrophobic group and a cationic solubilizing group. Typical cationic solubilizing groups are amine and quaternary groups.

As examples of suitable synthetic cationic detergents there may be noted the diamines such as those of the type $RNHC_2H_4NH_2$ wherein R is an alkyl group of about 12 to 22 carbon atoms, such as N-2-aminoethyl stearyl amine and N-2-aminoethyl myristyl amine; amide-linked amines such as those of the type $R^1CONHC_2H_4NH_2$ wherein R^1 is an alkyl group of about 9 to 20 carbon atoms, such as N-2-amino ethylstearyl amide and N-amino ethyl myristyl amide; quarternary ammonium compounds wherein typically one of the groups linked to the nitrogen atom is an alkyl group of about 12 to 18 carbon atoms and three of the groups linked to the nitrogen atom are alkyl groups which contain 1 to 3 carbon atoms, including such 1 to 3 carbon alkyl groups bearing inert substituents, such as phenyl groups, and there is present an anion such as halogen, acetate, methosulfate, etc. Typical quaternary ammonium detergents are ethyl-dimethylstearyl ammonium chloride, benzyl-dimethyl-stearyl ammonium chloride, trimethyl stearyl ammonium chloride, trimethyl-cetyl ammonium bromide, dimethyl-ethyl dilauryl ammonium chloride, dimethyl-propyl myristyl ammonium chloride, and the corresponding methosulfates and acetates.

Examples of suitable amphoteric detergents are those containing both an anionic and a cationic group and a hydrophobic organic group, which is advantageously a higher aliphatic radical, e.g. of 10–20 carbon atoms. Among these are the N-long chain alkyl aminocarboxylic acids (e.g. of the formula

$$R-\overset{R^2}{\underset{|}{N}}-R'-COOM)$$

the N-long chain alkyl iminodicarboxylic acids (e.g. of

the formula $RN(R'COOM)_2$) and the N-long chain alkyl betaines (e.g. of the formula

$$R-\overset{+\ R^3}{\underset{R^4}{N}}-R'-COO^-)$$

where R is a long chain alkyl group, e.g. of about 10–20 carbons, R' is a divalent radical joining the amino and carboxyl portions of an amino acid (e.g. an alkylene radical of 1–4 carbon atoms), M is hydrogen or a salt-forming metal, R^2 is a hydrogen of another monovalent substituent (e.g. methyl or other lower alkyl), and R^3 and R^4 are monovalent substituents joined to the nitrogen by carbon-to-nitrogen bonds (e.g. methyl or other lower alkyl substituents). Examples of specific amphoteric detergents are N-alkyl-beta-aminopropionic acid; N-alkyl-beta-iminodipropionic acid, and N-alkyl, N,N-dimethyl glycine; the alkyl group may be, for example, that derived from coco fatty alcohol, lauryl alcohol, myristyl alcohol(or a laurylmyristyl mixture), hydrogenated tallow alcohol, cetyl, stearyl, or blends of such alcohols. The substituted aminopropionic and iminodipropionic acids are often supplied in the sodium or other salt forms, which may likewise be used in the practice of this invention. Examples of other amphoteric detergents are the fatty imidazolines such as those made by reacting a long chain fatty acid (e.g. of 10 to 20 carbon atoms) with diethylene triamine and monohalocarboxylic acids having 2 to 6 carbon atoms, e.g. 1-coco-5-hydroxethyl-5-carboxymethylimidazoline; betaines containing a sulfonic group instead of the carboxylic group; betaines in which the long chain substituent is joined to the carboxylic group without an intervening nitrogen atom, e.g. inner salts of 2-trimethylamino fatty acids such as 2-trimethylaminolauric acid, and compounds of any of the previously mentioned types but in which the nitrogen atom is replaced by phosphorus.

The relative proportions of the novel hydroxyalkyl heterocyclic N-oxide and the other detergent may vary widely, e.g. in the range of ratios of 100:1 to 1:100; preferably about 5 to 30 parts of the novel heterocyclic N-oxide per 100 parts of the other detergent are used.

A very suitable dishwashing liquid detergent may contain, for example, a mixture of a linear higher alkylbenzene sulfonate and a higher alkyl ether sulfate in a ratio of about 0.4:1 to 1:1 together with the heterocyclic N-oxide. In one type of sulfate-alkylbenzenesulfonate mixture highly effective for this purpose, the alkylphenyl moiety has a molecular weight of 230 to 240; its alkyl group is largely (at least 80 mol percent) in the C_{10} to C_{12} range, at least half of the alkyls in the C_{10}–C_{12} range being C_{10} and C_{11}, the C_{10} and C_{11} being at least 45% of the total alkyl, at least 80% of the alkyl substituent being alkyl groups having the benzene attachment on the 3- (or higher, e.g. 3-, 4-, 5-, or 6-) carbon of the alkyl. The higher alkyl ether sulfate in this dishwashing formulation may, for example, have the formula $R(OCH_2CH_2)_nSO_4M$ where R is long chain alkyl of 10 to 15 carbon atoms, *n* is about 1 to 5 (e.g. about 3) and M is a cation such as ammonium, sodium, potassium, mono-, di- or triethanolammonium, etc.

Water-soluble builder salts may also be present, in the usual proportions, in the detergent formulations when heavy duty cleaning is desired. These salts include phosphates and particularly condensed phosphates (e.g. pyrophosphates or tripolyphosphates), silicates, borates and carbonates (including bicarbonates), as well as organic builders such as salts of nitrilotriacetic acid or ethylene diamine tetracetic acid. Sodium and potassium salts are preferred. Specific examples are sodium tripolyphosphate, potassium pyrophosphate, sodium hexametaphosphate, sodium carbonate, sodium bicarbonate, sodium sesquicarbonate, sodium tetraborate, sodium silicate, salts (e.g. Na salt) of methylene diphosphonic acid, trisodium nitrilotriacetate, or mixtures of such builders, including mixtures of pentasodium tripolyphosphate and trisodium nitrilotriacetate in a ratio, of these two builders, of 1:10

to 10:1, e.g. 1:1. The proportions of builder salt may be, for example, 50 parts or more (e.g. 50 to 1000 parts) per 100 parts of detergent. A granular heavy duty detergent composition for washing clothes may comprise, for example, about 15–18% linear tridecylbenzenesulfonate of the type disclosed in Rubinfeld U.S. Pat. 3,320,174, May 16, 1967, about 20–50% hydrated pentasodium tripolyphosphate, about 3 to 8% sodium silicate, about 2–5% of the novel N-2-hydroxydodecyl heterocyclic N-oxide, and the balance sodium sulfate. A heavy duty detergent liquid composition for washing clothes in cool water may comprise, for example, an aqueous solution containing about 10% of a non-ionic detergent, about 25% of tetrapotassium pyrophosphate, about 1–7% of the novel N-hydroxyalkyl heterocyclic N-oxide and about 4% sodium silicate. Optical brighteners and soil-suspending agents may be included in the usual minor amounts in each case.

In formulating the novel hydroxyalkyl heterocyclic N-oxides of this invention into skin lotions, the new compound may be incorporated into the well known hand lotions containing water-immiscible materials such as mineral oils, blends of liquid mineral oils with high boiling petroleum fractions (such as paraffin wax, petrolatum or oxocerite), lanolin, fatty oil esters such as glyceryl monostearate, and fatty acids such as stearic or oleic acid. These water-immiscible materials may be components of an oil phase of oil-in-water emulsion. A blend of about 1–3 parts of mineral oil, about 0.5–2 parts of either lanolin or lanolin alcohol or a mixture of these, about 1–3 parts of fatty acid and about 2.7 parts of polyhydroxy compound such as glyceryl monostearate may be used as the oil phase. The ratio of aqueous phase to oil phase is typically about 5:1 to 20:1. The aqueous phase may contain a detergent surfactant, for example, in concentration of about 0.1 to 5% of said phase. The amount of the novel N-hydroxyalkyl heterocyclic N-oxide in the lotion may be, for example, in the range of about 0.2–5%.

In a typical method for making the lotion comprising an oil-in-water emulsion, the oil phase and water phase are heated (e.g. to 70–80° C. say 74° C.) and the oil phase is added to the water phase and mixed throughly. The temperature is then lowered (e.g. to 35–50° C. say 40° C.) and additional ingredients such as glycerin and calcium caseinate or other hydrophilic colloid are incorporated into the water phase of the emulsion.

The novel hydroxyalkyl heterocyclic N-oxides of this invention may be used in shampoo compositions in which they may be blended with any suitable water-soluble anionic detergent, which may be one of the well known types used in shampoos, e.g. an alkyl sulfate of, for example, 12–18 carbon atoms, such as sodium lauryl sulfate or sodium tallow alcohol sulfate, other sulfate detergents such as the triethanolammonium salt of the monosulfate of an ethoxylated lauryl alcohol (made from, for example, 3 mols of ethylene oxide and one mol of coconut alcohol), or a sulfonated detergent, such as an alkylbenzenesulfonate or olefin sulfonate or an amphoteric detergent such as an N-long chain alkyl aminocarboxylic acid or an N-long chain alkyl iminodicarboxylic acid, as previously described herein. A typical shampoo composition may comprise, for example, an aqueous mixture containing about 1 to 15% of the novel hydroxyalkyl heterocyclic N-oxide and about 10 to 30% of the other detergent, and may be in free flowing liquid, cream, or lotion form.

The novel hydroxyalkyl heterocyclic N-oxides of this invention may also be used as constituents of toilet bars, in admixture with conventional toilet soaps, such as the usual sodium soap of a mixture of about 3 parts of tallow fatty acids and one part of coconut oil fatty acids, or in admixture with synthetic detergents such as the olefin sulfonates mentioned above or the long chain fatty acid (e.g. coconut oil fatty acid) monoglyceryl sulfates. In one example, about 15 parts of the novel hydroxyalkyl heterocyclic amine oxide is used with 100 parts of the other detergent (soap or synthetic).

The following examples are given to illustrate this invention further. In these examples, as in the remainder of the application, all proportions are by weight unless otherwise indicated.

EXAMPLE 1

20 grams of 1,2 epoxydodecane (B.P. 97–98° C. at 3.5 mm. Hg A) is heated with 10 grams of piperidine at 100° C. in a sealed container overnight. The resulting mixture is then fractionally distilled under vacuum; the fraction obtained at a head temperature of 115° C. and a pressure of 0.05 mm. Hg A, is a clear oily liquid, N-2-hydroxydodecyl piperidine. To 22.9 grams of this product, dissolved in 40 cc. of a 1:1 mixture of methanol and water, there are added, dropwise, 9.6 grams of aqueous 30% hydrogen peroxide and the mixture is heated at 60° C. for 1 hour. Thereafter any excess peroxide is decomposed by adding 0.1 gram platinum black-on-charcoal (of 5% Pt content) and maintaining the mixture for 3 hours, after which the platinum-on-charcoal catalyst is filtered off, and the filtrate is evaporated to recover the crude product, which is then recrystallized from 150 cc. of acetone to produce 11.7 grams of purified N-2-hydroxydodecyl-piperidine N-oxide which melts and decomposes at 143–151° C.

EXAMPLE 2

A mixture of C_{12}–C_{16} alpha olefins is epoxidized in conventional manner to give a mixture of 1,2-epoxyalkanes of 12–16 carbon atoms having an average molecular weight of about 207. This is substituted mol-for-mol for the epoxydodecane used in Example 1.

EXAMPLE 3

Pyrrolidine is substituted mol-for-mol for the piperidine used in Example 1, to produce N-2-hydroxydodecylpyrrolidine oxide.

EXAMPLE 4

A satisfactory detergent composition having suitable overall detergency and foaming characteristics contains 0.8 g. of the hydroxyalkyl heterocyclic amine oxide of Example 1, 3.3 g. sodium linear tridecylbenzenesulfonate and 6.7 g. anhydrous pentasodium tripolyphosphate.

EXAMPLE 5

A hand lotion is formulated from the following ingredients:

(a) An aqueous mixture of 74.4 parts deionized water, 1 part sodium lauryl sulfate, 1 part of the hydroxyalkyl heterocyclic amine oxide of Example 1, and, as preservatives, 0.18 part methyl p-hydroxybenzoate and 0.22 part propyl p-hydroxybenzoate.

(b) A mixture of 2.0 parts light mineral oil, 5.0 parts glyceryl monostearate, 1.0 part lanolin alcohol (Amerchol H9) and 1.5 part stearic acid (triple pressed).

(c) A mixture of 3.0 parts of glycerine, 0.5 part calcium caseinate and 5.0 parts deionized water.

(d) A mixture of 1 part benzyl alcohol and 0.5 part perfume.

The oily mixture (b) is melted and added to the aqueous mixture (a) while the latter is in heated agitated condition, to form an emulsion, which is allowed to cool. To the resulting warm mixture the glycerine-caseinate-water blend (c) is added, with stirring, and after further cooling, to room temperature, the benzyl-alcohol-perfume mixture (d) is added. The presence of the benzylalcohol helps to control the viscosity of the lotion.

EXAMPLE 6

Liquid aqueous compositions of satisfactory detergent and foaming power are formulated as follows:

(a) A dishwashing composition is formulated from the following ingredients: sodium linear alkylbenzenesulfonate, 22%; ammonium salt of monosulfate of ethoxylated

sulfated straight chain primary alkanol (the alkanol having 12–14 carbon atoms and the ethoxylated product containing 3 ethylene oxide units per molecule), 10%; mixed lauric/myristic (70/30) ethanolamide, 5%; N-2-hydroxydodecyl-piperidine oxide, 5%; ethanol, 5.3%; sodium xylene sulfonate, 5.8%; and water, constituting substantially the remainder of the composition.

The alkylbenzenesulfonate is produced by sulfonation of an alkylbenzene of molecular weight 238, containing mainly alkyl groups of 10 to 12 carbons.

(b) Example 6(a) is repeated except that the fatty acid monoethanolamide is omitted from the composition.

(c) A liquid detergent composition is formulated from: the alkylbenzenesulfonate of Example 6(a), 35%; the ammonium alkyl ether sulfate of Example 6(a), 4%; N-2-hydroxydodecyl-piperidine oxide, 5%; ethanol, 5.1%; urea, 5%; sodium xylene sulfonate, 1.7%, and water.

(d) Another liquid detergent composition contains 23% of the sodium linear alkylbenzenesulfonate of Example 6(a), 13% of the ammonium salt of sulfated ethoxylated alkanol of Example 7; 5% of the N-2-hydroxydodecyl piperidine oxide; 5% of sodium xylene sulfonate (hydrotrope), and water. The mixture is adjusted to a pH of 7.5.

(e) A liquid detergent for use in the machine-washing of clothes in cool water is prepared by mixing in the following order, at a temperature of 145–180° F. 32.3 parts of water; 0.005 part of a non-ionic detergent which is a polyoxyethylated nonyl phenol (specifically a condensation product of 15 mols of ethylene oxide and 1 mol of nonyl phenol); and 1 part of a copolymer of vinyl-methyl ether and maleic anhydride (Gantrez AN–908); under these conditions the anhydride ring of the copolymer opens, forming an acidic partial ester with the polyethoxylated nonyl phenol. There are then added 1.6 parts of an aqueous 45.4% solution of KOH; 0.69 part of sodium carboxymethylcellulose; 2 parts of a 10% aqueous dispersion of fluorescent brighteners; 1.7 parts of an aqueous 1% solution of blue dye (Polar Brilliant Blue); 0.12 part of an aqueous 0.5% solution of green dye (D & C Green #8); 8.56 part of aqueous sodium silicate of 43.5% concentration in which the Na_2O; SiO_2 mol ratio is 1:2.35); 10 parts of a non-ionic detergent which is a polyoxyethylated alkyl phenol (specifically a condensation product of 10 mols of ethylene oxide and one mol of branched chain dodecyl phenol); 1 to 5 parts of N-hydroxydodecyl-piperidine oxide; and 41 parts of an aqueous 60% solution of tetrapotassium pyrophosphate, together with a small amount of perfume. The brighteners used in the above formulation include (a) 0.08 part of Geigy "Tinopal RBS–200%," a naphthotriazole stilbene sulfonate brightener, and (b) 0.12 part of another stilbene brightener bis (anilino diethanolamino s-triazinyl) stilbene disulfonic acid.

EXAMPLE 7

(a) A shampoo composition is prepared by mixing 2 to 5% N-2-hydroxydodecyl-piperidine oxide, 10% triethanolammonium lauryl sulfate, and the balance, water.

(b) In another shampoo composition there is used

10% of sodium monosulfate of ethoxylated lauryl alcohol (made with 3 to 4 mols of ethylene oxide per mol of lauryl alcohol) in place of the triethanolammonium lauryl sulfate of Example 7(a).

(c) Another shampoo composition contains 10% of triethanolamine oleate, 9% of N-2-hydroxydodecyl-piperidine oxide, and 1.6% of a cationic dispersing agent, oleyl dimethyl benzyl ammonium chloride and, the balance, water.

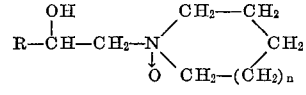
(d) A shampoo composition, in gel form, contains 68% of an aqueous 41% solution of triethanolammonium lauryl sulfate; 6% sorbitol; 4% ethyl alcohol; 1.8% methyl cellulose, serving as a thickener; 5% lauric-myristic diethanolamide; 1% N-2-hydroxydodecyl-piperidine oxide; a small amount of formaldehyde as a preservative and the balance water. The pH is adjusted to 7.2, as by addition of triethanolamine.

While the invention finds its greatest utility in the embodiment in which the unsubstituted 2-hydroxyalkyl heterocyclic amine oxides are used, it is also within the broader scope of this invention to use long chain 3-hydroxyalkyl heterocyclic amine oxides (which may be made in the same way as the corresponding 2-hydroxyalkyl compounds, using the corresponding 1,3 oxetane in place of the 1,2 epoxide) and to use those hydroxyalkyl piperidine or pyrrolidine oxides which have a substituent such as lower alkyl (e.g. methyl, ethyl or propyl) on one or more of the carbon atoms of the heterocyclic ring, forming such compounds as N-(3-hydroxydodecyl) piperidine oxide or N-(2-hydroxyhexadecyl) 2-methyl-pyrrolidine oxide.

It is to be understood that the foregoing detailed description is merely given by way of illustration and that many variations may be made therein without departing from the spirit of the invention.

What is claimed is:

1. A heterocyclic oxide of the formula



where R is a long chain alkyl group of six to twenty carbon atoms and n is zero or one; or a heterocyclic oxide of said formula in which the ring is lower alkyl substituted.

2. An oxide as in claim 1 in which R has 10 to 14 carbon atoms.

3. N-2-hydroxydodecyl piperidine N-oxide.

4. N-2-hydroxydodecyl pyrrolidine N-oxide.

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