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3,484,523

QUATERNARY AMMONIUM-TERTIARY AMINE
OXIDE COMPOSITIONS

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No Drawing. Continuation-in-part of application Ser. No. 500,282, Oct. 21, 1965. This application Dec. 27, 1966, Ser. No. 604,598

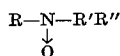
The portion of the term of the patent subsequent to Jan. 3, 1984, has been disclaimed
Int. Cl. A61k 27/00; C11d 1/62

U.S. Cl. 424-248

3 Claims

ABSTRACT OF THE DISCLOSURE

A composition for both cleaning and degerming human skin and similar organic tissue, consisting of at least one tertiary amine oxide of the formula:

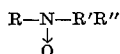


wherein R is a member of the group consisting of alkyl and alkenyl having 8 to 20 carbon atoms, and R' and R'' are selected from the group consisting of lower alkyl, hydroxy lower alkyl and individual valences of heterocyclic radicals such as morpholine, and at least one germicidal quaternary ammonium compound having a phenol coefficient of at least 100 with respect to *Staphylococcus aureus* and *Salmonella typhosa* at 20° C., the amine oxide and quaternary compounds being respectively present in a proportion of between less than 5:1 to about 0.5:1, by weight.

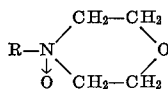
This invention relates to a composition for simultaneously cleaning and degerming human skin and other organic tissues, and it particularly relates to compositions utilizing a tertiary amine oxide and a microbiocidally active quaternary ammonium salt.

This is a continuation-in-part of co-pending application Ser. No. 500,282, filed Oct. 21, 1965, now Patent No. 3,296,145.

The amine oxides which are employed according to the present invention are alkyl dimethyl amine oxides in which the alkyl radical contains from 8 to 20 carbon atoms and correspond to the general formula



where R contains from 8 to 20 carbon atoms and may, if desired, be unsaturated in nature, where R' and R'' may be methyl, ethyl, propyl, isopropyl, hydroxyethyl, hydroxyethoxyethyl or hydroxyethyl polyethoxyethyl radicals and wherein the oxygen is linked to nitrogen by means of a semi-polar bond. If desired, R' and R'' may jointly constitute the $-\text{CH}_2-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_2-$ radical, i.e. the above formula is:



While all of these amine oxides have deterative power, those containing fourteen carbon atoms, or less, are also good foaming agents whereas those possessing 16 carbon atoms, or more, are poor foaming agents.

As suitable quaternary ammonium compounds utilizable in the compositions of this invention, there may be employed any water-soluble quaternary ammonium salt having a long alkyl radical containing from 8 to 22 carbon atoms attached either directly to the nitrogen atom

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or through an intermediate benzyl or phenoxyethoxyethyl radical and having a phenol coefficient of at least 100 with respect to the *Staphylococcus aureus* and *Salmonella typhosa* at 20° C. when determined by the standard method given in the "Official Method of Analysis of the Association of Official Agricultural Chemists," Ninth Edition (1960), page 63 et seq. Typical examples of these quaternary ammonium compounds are alkyl trimethyl ammonium chlorides, alkyl-benzyl trimethyl ammonium chlorides, alkyl dimethyl benzyl ammonium chlorides, alkyl dimethyl menaphthyl ammonium chlorides, alkyl dimethyl substituted benzyl ammonium chlorides in which the benzyl radical is substituted with one or more side chains containing from 1 to 5 carbon atoms such, for example, as methyl, dimethyl, ethyl, isopropyl, ter-butyl, n-amyl, isoamyl, tetramethyl, trimethyl and the like in which the carbon atoms may all be in the same or different side chains or in which the benzyl radical may be substituted by an alkylene group such as tetrahydro menaphthyl or in which the benzyl radical bears one, two or more halogen atoms such as chlorine or bromine, alkyl pyridinium chlorides, alkyl isoquinolinium chlorides and bromides, alkyl lower-alkyl pyrrolidinium chlorides, alkyl lower-alkyl morpholinium chlorides in all of which the alkyl group may have from 8 to 22 carbon atoms and the lower-alkyl group may have from 1 to 4 carbon atoms and alkyl phenoxyethoxyethyl dimethylbenzyl ammonium chloride in which the alkyl radical may be iso-octyl or nonyl and in which the benzyl radical may, if desired, be substituted by a methyl radical. Various other analogs of these quaternaries may also be employed such, for example, as cetyl dimethyl ethyl ammonium bromide or oleyl dimethyl ethyl ammonium bromide. Instead of the foregoing chlorides, there may also be employed the corresponding bromides, methosulfates, ethosulfates or other water-soluble analogs. Mixtures of two or more of the foregoing quaternary ammonium compounds may also be employed. In particular, it is preferred to employ a mixture of alkyl dimethyl benzyl ammonium chloride in which the alkyl radical blend contains at least 50% myristyl, together with alkyl dimethyl ethyl-benzyl ammonium chloride in which the alkyl radical blend is predominantly (at least 50%) C₁₂, this blend being employed in approximately 1:1 ratio, by weight.

It is preferred to use the quaternary ammonium compounds which have phenol coefficients of more than 500 against *Staphylococcus aureus*; such, for example, are BTC-824, an alkyl dimethyl benzyl ammonium chloride in which alkyl is 60% C₁₄, 30% C₁₆, 5% C₁₂ and 5% C₁₈; Tetrosan 3,4 D, an alkyl dimethyl dichlorobenzyl ammonium chloride in which alkyl is 50% C₁₂, 30% C₁₄, 17% C₁₆ and 8% C₁₈; BTC-471 and BTC-927, which are, respectively, alkyl dimethyl ethyl-benzyl and alkyl dimethyl dimethylbenzyl ammonium chlorides in which the alkyl distribution is the same as in Tetrosan 3,4 D; lauryl dimethyl menaphthyl or tetrahydromenaphthyl ammonium chloride; lauryl isoquinolinium bromide and the like; or mixtures thereof. The aforesaid products are sold by Onyx Chemical Company under the previously mentioned trademark designations.

The compositions of this invention are preferably prepared as liquids for convenient use as a surgical or other degerming scrub soap. However, if desired, they may be thickened by certain additives into a gel or a paste or to be molded into a bar by methods well known to the art; or they may be prepared as a powder, as, for example, as an adduct with urea, by mixing the composition with crystalline urea in sufficient amounts to produce a free-flowing powder.

The aforementioned application Serial No. 500,282, and its abandoned parent application Serial No. 339,307,

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filed January 21, 1964, indicated that a proportion of about 50:1 to about 5:1 of the disclosed amine oxide relative to the disclosed quarternary ammonium compounds could be utilized for the disclosed purposes. It has, however, now been unexpectedly discovered that this proportion can be as low as 0.5:1 and still be compatible with the anionic surface active agents as well as providing very effective microbiocidal action.

The following examples illustrate the present invention, but are not to be considered limitative thereof except as claimed:

EXAMPLE 1

A series of surgical scrub compositions were prepared containing the following listed components in the individually listed parts by weight. There were four compositions listed as "Comp. A," "Comp. B," "Comp. C," and "Comp. D." Each composition was prepared by mixing under ambient conditions, and was adjusted to a pH of 6.0, to give a non-irritating surgical scrub having satisfactory slip and emollient properties.

Composition.....	In parts by weight			
	A	B	C	D
Lauryl dimethylamine oxide, 30%.....	2.0	2.0	1.0	5.9
Stearyl dimethylamine oxide, 30%.....	1.1	1.1	0.75	2.0
50% aqueous solution of quaternary ammonium germicide blend of equal parts of alkyl dimethyl benzyl ammonium chloride and alkyl dimethyl ethylbenzyl ammonium chloride, wherein the first alkyl has a distribution of 60% C ₁₄ , 30% C ₁₆ , 5% C ₁₂ , and 5% C ₁₈ , and the second alkyl has a distribution of 50% C ₁₂ , 30% C ₁₄ , 17% C ₁₆ , and 3% C ₁₈	2.0	1.0	2.0	1.0
Acetylated lanolin.....	0.5	0.5	0.5	0.5
Hydroxyethyl cellulose.....	0.5	0.5	0.5	0.5
Water.....	93.9	94.9	95.25	90.1
Ratio, amine oxide to quaternary.....	1:1	2:1	0.5:1	4.8:1

EXAMPLE 2

A series of detergent-sanitizer-softener compositions were prepared in the same manner as in Example 1. These compositions are identified as follows as "Comp. E," "Comp. F," and "Comp. G":

Composition.....	In parts by weight		
	E	F	G
Sodium tripolyphosphate.....	55.5	55.5	55.5
Sodium metasilicate.....	5.1	5.1	5.1
Sodium bicarbonate.....	36.7	34.7	35.7
Optical brightener (Uvitex SIA—Ciba).....	0.071	0.071	0.071
50% aqueous solution of quaternary ammonium germicide blend of equal parts of alkyl dimethyl benzyl ammonium chloride and alkyl dimethyl ethylbenzyl ammonium chloride, wherein the first alkyl has a distribution of 60% C ₁₄ , 30% C ₁₆ , 5% C ₁₂ , and 5% C ₁₈ , and the second alkyl has a distribution of 50% C ₁₂ , 30% C ₁₄ , 17% C ₁₆ , and 3% C ₁₈	1.23	1.23	1.23
50% aqueous solution of a mixture of 3 parts of 75% active di-(hydrogenated tallow), dimethyl ammonium methosulfate, and 75% active stearyl dimethyl benzyl ammonium chloride (softener for fabrics and the like).....	1.43	1.43	1.43
Stearyl dimethylamine oxide, 30%.....	0	2.0	1.0
Ratio, amine oxide to quaternary germicide.....	0:1	1:1	0.5:1

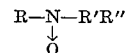
Killing dilutions were run on the preceding compositions by the method given in "Official Methods of Analysis of the Association of Official Agricultural Chemists," Ninth Edition (1960), page 63 et seq., using as test organisms both *Staphylococcus aureus* and *Salmonella*

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typhosa. The killing dilutions were distributed around 1/65,000 (based on 100% quaternary activity), and were found to be almost identical to the corresponding aqueous dilutions of such quaternaries, per se. On this basis, the combination of the amine oxides and the quaternary ammonium compounds are shown to be bacteriologically compatible.

The invention claimed is:

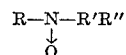
1. A germicidal agent consisting essentially of (1) at least one tertiary amine oxide of the formula:



wherein R is a member of the group consisting of alkyl and alkenyl having 8 to 20 carbon atoms, and wherein R' and R'' are selected from the group consisting of methyl, ethyl, propyl, isopropyl, hydroxyalkyl, hydroxyalkoxyalkyl, hydroxyalkyl polyalkoxyalkyl, and morpholine containing R', R'' and N as members, the alkyl of the hydroxyalkyl compounds being lower alkyl, and (2) at least one germicidal quaternary ammonium compound having at least one long chain alkyl group of 8 to 22 carbon atoms attached to the quaternary nitrogen and having a phenol coefficient of at least 100 with respect to *Staphylococcus aureus* and *Salmonella typhosa* at 20° C., the amine oxide and quaternary ammonium compound being respectively present in the proportion of 4.8:1 to about 0.5:1, by weight.

2. The germicidal agent of claim 1 in admixture with an softening effective amount of a fabric softener.

3. A method of simultaneously cleaning and sterilizing human tissue which comprises applying to said tissue a composition consisting essentially of (1) at least one tertiary amine oxide of the formula:



wherein R is a member of the group consisting of alkyl and alkenyl having 8 to 20 carbon atoms, and wherein R' and R'' are selected from the group consisting of methyl, ethyl, propyl, isopropyl, hydroxyalkyl, hydroxyalkoxyalkyl, hydroxyalkyl polyalkoxyalkyl, and morpholine containing R' and R'' and N as members, the alkyl of the hydroxyalkyl compounds being lower alkyl, and (2) at least one germicidal quaternary ammonium compound having at least one long chain alkyl group of 8 to 22 carbon atoms attached to the quaternary nitrogen and having a phenol coefficient of at least 100 with respect to *Staphylococcus aureus* and *Salmonella typhosa* at 20° C., the amine oxide and quaternary ammonium compound being respectively present in the proportion of 4.8:1 to about 0.5:1, by weight.

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U.S. Cl. X.R.

424—274, 263, 258, 329, 325