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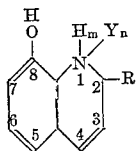
## BACTERIOSTATIC AND FUNGISTATIC CLEANSING COMPOSITIONS

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This invention relates to certain novel compositions comprising (1) a conventional cleansing compound such as soap or other organic cleansing detergent including either anionic or non-ionic surface active detergents and mixtures thereof; and (2) a fungistatic and bacteriostatic compound of quinolinic derivation.

According to this invention fabrics which are washed with soaps and organic detergents having incorporated therein a small amount of certain quinolinic derivatives become capable of resisting the growth of bacteria and fungi. In particular this invention relates to cleansing compositions comprising well known cleansing compounds and certain derivatives of quinoline which will control the growth of such organisms as *Micrococcus pyogenes* var. *aureus* and *Aspergillus niger* on cloth surfaces containing the same.

In accordance with this invention the aforementioned organic surface active cleansing detergents are rendered fungistatic and bacteriostatic by incorporating therein derivatives of 8-hydroxy quinoline compounds of the formula



wherein R is an alkyl radical having from one to about twelve carbon atoms, Y is an anionic radical selected from the group consisting of chloride, bromide, maleate, sulfate, acetate, benzoate and tartrate, and m and n are like integers selected from 0 and 1.

As illustrative of the quinoline derivatives, within the above formula, which may be incorporated in soaps and other synthetic organic detergents, or mixtures thereof, are the following:

2-methyl-8-quinolinol  
2-butyl-8-quinolinol  
2-heptyl-8-quinolinol

As will be apparent, the specific quinoline derivatives listed above, and the homologues thereof, can be incorporated in said soaps and other synthetic organic detergents in the form of any one of the salts defined by Y in the formula above.

It is to be noted that the salutary effect of inhibiting the growth of fungi and bacteria is not true of all quinoline derivatives as evidenced by the following compounds which were found to be not active from a fungistatic and bacteriostatic standpoint.

5,7-dichloro-2-(p-chloro-styryl)-8-quinolinol  
5,7-dichloro-2-(o-chloro-styryl)-8-quinolinol  
5,7-dichloro-2-(2,4-dichloro-styryl)-8-quinolinol  
6-amino-1,2-dihydro-2,2,4-trimethylquinoline  
6-amino-1,2,3,4-tetrahydro-1,2,2,4-tetramethylquinoline  
1,2,3,4-tetrahydro - 1,2,2,4 - tetramethyl - 6 - methylaminoquinoline  
6-dimethylamino-1,2-dihydro - 2,2,4 - trimethylquinoline  
6 - diethylamino - 1,2 - dihydro - 1,2,2,4 - tetramethylquinoline  
5,7-dichloro-2 - (3,3,3 - trichloropropenyl) - 8 - quinolinolquinoline  
8-hydroxy-1-octyl-1-quinolinium bromide

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The above illustrative compounds clearly indicate not only the criticality of the presence of certain substituents but also of the necessity for the absence of certain substituents on the quinoline nucleus.

In the examples of desired compositions to follow and as used herein, the term "soap" is employed in its popular meaning and refers to cleansing agents usually made by the action of alkali on fat or fatty acids, e.g., the sodium or potassium salts of either saturated or unsaturated fatty acids. By way of example a solid soap, which may be used, is a mixture of 80 percent sodium soap and 20 percent potassium soap produced from a 70 percent tallow and 30 percent coconut oil glyceride blended in accordance with U.S. Patent No. 2,295,594. The same results are also obtainable by using a liquid soap instead of a solid soap such as that having a 40 percent alkali metal fatty acid soap content prepared from an alkali metal compound and a mixture of fatty acids obtained from a mixture of 75 percent coconut oil and 25 percent olive oil. Other alkali metal soaps of higher fatty acids of animal or vegetable origin may be used such as stearic, lauric, palmitic, oleic, linoleic, ricinoleic, and the like, including mixtures thereof obtained from tallow, lard, coconut oil, palm oil, castor oil, olive oil, hydrogenated cottonseed and fish oils, and the like.

Other organic anionic detergents of this invention in addition to soap include the well known surface active alkali metal sulfonates and sulfates. Representative of these are the long chain alkyl aryl sulfonates, i.e. those wherein the alkyl radical is straight or branched in structure and contains from 8 to 22 carbon atoms, but preferably 10 to 16 carbon atoms, examples of which being octyl, decyl, dodecyl, keryl, pentadecyl, hexadecyl, octadecyl, mixed long chain alkyls derived from long chain fatty materials such as the lauryl radical, cracked paraffin wax olefins, polymers of lower mono-olefins such as propylene tetramer and the like, and wherein the aryl radical is derived from benzene, toluene, xylene, phenol, the cresols, naphthalene, and the like. Specific examples of such comprise sodium decyl benzene sulfonate, sodium dodecyl benzene sulfonate, sodium lauryl benzene sulfonate and sodium hexadecyl benzene sulfonate. Further descriptive information regarding these compounds may be found in U.S. Patent 2,264,737.

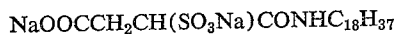
Other sulfonate surface-active agents are contemplated also, e.g. the long chain alkyl sulfonates such as sodium hexadecane sulfonate and sodium octadecane sulfonate.

The well known sulfate detergents having 12 to 26 carbon atoms and particularly those having an alkyl radical of about 8 to 22 carbon atoms may be employed as anionic detergent bases in accordance with this invention. Such detergents include the sulfuric acid esters of polyhydric alcohols incompletely esterified with fatty acids, e.g. sodium coconut oil monoglyceride monosulfate, sodium tallow diglyceride monosulfate, the pure and mixed higher alkyl sulfates such as sodium lauryl sulfate and sodium cetyl sulfate.

Additional anionic surface active sulfonates and sulfates contemplated by this invention are the sulfated and sulfonated alkyl acidamides such as Igepon T



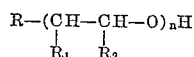
the sulfated and sulfonated esters such as Igepon AP ( $RCOOCH_2SO_3Na$  where R is an alkyl radical containing from 12 to 18 carbon atoms), sodium salt of the bisulfate of a dialkyl dicarboxylate, sodium salt of the sulfonic acid derivatives of a dialkyl dicarboxylate, sodium sulfosuccinic esters such as



and the like.

In addition to the organic anionic detergents; the non-

ionic surface-active agents containing the desired quino-  
line derivatives provide effective bacteriostatic and fungi-  
static cleaning compositions. The non-ionic surface-  
active agents contemplated are viscous liquid to wax-like  
water-soluble surface-active substances containing a poly-  
glycol ether group of the structure



wherein  $\text{R}_1$  and  $\text{R}_2$  are hydrogen or short chain alkyl,  
where  $n$  is an integer greater than 3, and where  $\text{R}$  is a  
residue of a compound of a monomeric organic compound  
having an active hydrogen, e.g. alcohols, phenols, amides,  
primary amines, secondary amines, carboxylic acids,  
etc. These non-ionic detergents are well known (note  
U.S. 1,970,578 and U.S. 2,213,477) and may be typified  
by the polyalkylene oxide derivatives (i.e. polyethylene  
oxide, polypropylene oxide, polybutylene oxide) of water-  
insoluble higher fatty acids, such as lauric, oleic, palmitic,  
and stearic acid and the like of mixtures thereof, such as  
the mixtures of fatty acids, obtained from animal and  
vegetable fats and oils or by oxidation of petroleum frac-  
tions such as paraffin wax. They may also be exemplified  
by the polyalkylene oxide derivatives of such water-  
insoluble organic hydroxy compounds as higher aliphatic  
alcohols (i.e. the alcohols corresponding to the fatty acids  
specified above or mixtures thereof), oil or phenols, par-  
ticularly alkyl phenols containing at least six alkyl carbon  
atoms as isooctyl-, ditertiary butyl-, triisopropyl-, nonyl-,  
dodecyl-, octadecyl- phenols or naphthols, or of higher  
alkyl alcohols, such as benzyl alcohol, cinnamyl alcohol.  
They may also be exemplified by the polyalkylene oxide  
derivatives of such amines as stearyl, lauryl, dicyclohexyl,  
dibutyl amine and the like. A particularly useful non-  
ionic detergent is that obtained by condensing one mol  
of tall oil with 5 to 15 mols of ethylene oxide (see U.S.  
2,550,691).

The term "detergent" as used in this patent application  
has reference to any one of the aforementioned classes  
of organic cleansing compounds (soaps, anionic surface-  
active detergents, and non-ionic surface-active detergents)  
or mixtures thereof.

The term "mycobacteriostatic detergent composition"  
for the purposes of this patent application refers to those  
detergent compositions which are effective against *Micro-*  
*coccus pyogenes* var. *aureus* (bacterium) and *Aspergillus*  
*niger* (fungus). If the detergent composition is effective  
against the aforementioned micro-organisms, it is con-  
sidered to be bacteriostatic and fungistatic since the above  
bacterium and fungus are considered to be representative  
of bacteria and fungi, respectively. Mycobacteriostatic is  
a generic expression to describe compounds which are  
both fungistatic and bacteriostatic.

The term "fabric" is used in its customary meaning  
and refers to articles made from woven or knitted fibers  
whether the latter are of animal (wool, silk, etc.), plant  
(cotton, linen, etc.) or synthetic origin (nylon, rayon,  
etc.).

Illustrative of fungistatic and bacteriostatic (mycobac-  
teriostatic) compositions of this invention and the manner  
in which these compositions are used to inhibit growth of  
fungi and bacteria on fabrics are the following examples:

#### Example I

Cotton fabric swatches are placed in water at 140° F.  
containing (a) 0.25 percent of a detergent consisting of  
a finely comminuted soap by weight of the water and (b)  
a bacteriostatic and fungistatic compound consisting of  
0.5 percent of 8-quinolinol by weight of the detergent  
employed. The resulting solution or wash water is in  
the ratio of 20:1 with respect to the cotton fabric em-  
ployed. The fabric is washed with the solution for 10  
minutes and followed with two water rinses of two min-

utes each. The swatches are then sterilized in an auto-  
clave for 5 minutes at 15 p.s.i. Three sets of smaller  
swatches are cut from the above swatches and sterilized.  
Each set is then inoculated with (1) *Micrococcus pyogenes*  
var. *aureus* in dextrose broth; (2) *Aspergillus niger* in a  
dilute Saboraud dextrose broth and (3) *Aspergillus niger*  
in distilled water on a carbon free agar medium, respec-  
tively. After 24 hours incubation the swatches inoculated  
with *Micrococcus pyogenes* var. *aureus* are examined for  
growth by adding methyl red to the swatches. A pH  
change to the methyl red range is indicative of growth  
but there was no evidence of such growth. The *Aspergil-*  
*lus niger* inoculated swatches are then examined visually  
for growth after seven days of incubation, but there was  
no evidence of growth. On the other hand control  
swatches washed in the detergent solution only show  
copious amounts of growth.

The soap referred to above is a mixture of 80 percent  
sodium soap and 20 percent potassium soap produced  
from a 70 percent tallow and 30 percent coconut oil  
glyceride blend in accordance with U.S. Patent 2,295,594.

#### Example II

The procedure of Example I is repeated in every re-  
spect with the same results except that the fabric is nylon.

#### Example III

The procedure of Example I is repeated in every re-  
spect with the same results except that the detergent is of  
the well known organic anionic type consisting essentially  
of a sodium sulfonate of an alkylated benzene where the  
alkyl group has an average of 12 carbon atoms, and the  
fungistatic and bacteriostatic compound is 1-dodecyl-8-  
hydroxy-1-quinolinium bromide.

#### Example IV

The procedure of Example III is repeated in every re-  
spect with the same results except that the fungistatic  
and bacteriostatic compound is 8-hydroxy-1-quinolinium  
sulfate and the amount used is 1 percent by weight of the  
detergent used.

#### Example V

The procedure of Example IV is repeated in every re-  
spect with the same results except that the fungistatic and  
bacteriostatic compound is 8-hydroxy-1-quinolinium male-  
ate.

#### Example VI

The procedure of Example I is repeated in every re-  
spect with the same results except that the detergent used  
is of the non-ionic type obtained by condensing one mol  
of tall oil with 5 to 15 mols of ethylene oxide which de-  
tergent is described in U.S. Patent 2,550,691.

The substituted quinoline compounds of this invention  
are also useful in preparing cleansing compositions for-  
mulated from mixtures of detergents plus other ingredients  
as illustrated by the following compositions:

|                                                                                              | Parts by weight |
|----------------------------------------------------------------------------------------------|-----------------|
| Composition A:                                                                               |                 |
| Triethanolamine lauryl sulfate-----                                                          | 60              |
| Methyl cellulose-----                                                                        | 2               |
| Propylene glycol-----                                                                        | 4               |
| Potassium stearate-----                                                                      | 6               |
| Water-----                                                                                   | 130             |
| 8-quinolinol-----                                                                            | 1               |
| Composition B:                                                                               |                 |
| Tall oil-ethylene oxide condensation product (1<br>mol tall oil-11 mols ethylene oxide)----- | 20              |
| Carboxy methyl cellulose, sodium-----                                                        | 4               |
| Sodium tripolyphosphate-----                                                                 | 80              |
| Sodium dodecyl benzene sulfonate-----                                                        | 80              |
| Sodium sulfate-----                                                                          | 200             |
| 8-hydroxy-1-quinolinium sulfate-----                                                         | 1               |

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In addition the compounds of this invention may be incorporated in a soap such as the following:

|                                       | Parts by weight |
|---------------------------------------|-----------------|
| Borax .....                           | 20              |
| Sodium carbonate .....                | 60              |
| Potassium stearate .....              | 20              |
| Water .....                           | 50              |
| 8-hydroxy-1-quinolinium maleate ..... | 10              |

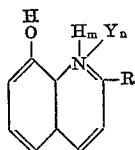
It will be apparent from the foregoing examples that relatively small amounts, e.g., from 0.2 to 2 percent by weight based on the detergent of the substituted quinoline compounds in cleansing compositions comprising detergents and mixtures thereof will produce effective mycobacteriostatic compositions. Although amounts as low as 0.1 percent by weight or less based upon the weight of the detergent used have proven satisfactory, it is preferred to use the substituted quinoline compounds in amounts of 1 to 3 percent based on the weight of the detergent. While larger amounts up to 10 percent and even 50 percent of the quinoline compounds with respect to the detergent base may be used, the upper limit will be determined by practical considerations. In addition various coloring agents, water softeners, perfumes, extenders, and the like may be included where desirable.

While this invention has been described with respect to certain embodiments, it is to be understood that it is not to be so limited in that variations and modifications thereof obvious to those skilled in the art may be made without departing from the spirit or scope of this invention.

This application is a continuation-in-part of application Serial Number 722,836, filed March 21, 1958, now abandoned.

What is claimed is:

1. A cleansing composition comprising a synthetic organic detergent selected from the class consisting of anionic and non-ionic detergents and mixtures thereof, and a mycobacteriostatic amount of a substituted quinoline of the formula



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wherein R is an alkyl radical having from 1 to 12 carbon atoms, Y is an anionic radical selected from the group consisting of chloride, bromide, maleate, sulfate, acetate, benzoate and tartrate, and m and n are like integers selected from 0 and 1.

2. A cleansing composition comprising a synthetic organic detergent selected from the class consisting of anionic and non-ionic detergents and mixtures thereof, and a mycobacteriostatic amount of 2-methyl-8-quinolinol.

3. A cleansing composition comprising a synthetic organic detergent selected from the class consisting of anionic and non-ionic detergents and mixtures thereof, and a mycobacteriostatic amount of 2-butyl-8-quinolinol.

4. A cleansing composition comprising a synthetic organic detergent selected from the class consisting of anionic and non-ionic detergents and mixtures thereof, and a mycobacteriostatic amount of 2-heptyl-8-quinolinol.

5. The method of controlling fungal and bacterial growth on cloth fabrics in contact with fungi and bacteria which comprises washing the cloth fabrics with the composition of claim 1.

6. The method of controlling *Micrococcus pyogenes* var. *aureus* which comprises washing cloth fabrics in contact with said *Micrococcus pyogenes* var. *aureus* with the composition of claim 1.

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