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# UNITED STATES PATENT OFFICE

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## ANTISEPTIC DETERGENT COMPOSITION

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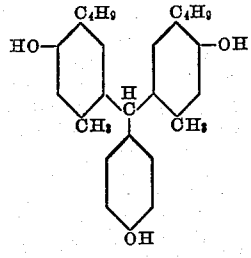
1

This invention relates to new and novel detergent compositions. More particularly it relates to detergent compositions containing a hydroxy aromatic compound or salts thereof exhibiting antiseptic properties. Still more particularly it relates to antiseptic detergent compositions containing 4,4' - (p - hydroxy benzylidene) - bis - (3-methyl-6-tert. butyl phenol).

Hydroxy substituted aromatic hydrocarbons such as phenol, cresols, the alkylated resorcinols, the hydroxy diaryl alkanes, and the like, have long been claimed as effectively preventing or arresting the growth or action of micro-organisms either by inhibiting their activity or by destroying them. However, it is well known that hydroxy substituted aromatic hydrocarbons tend to lose their antiseptic effectiveness in alkaline media and there is much evidence to the effect that detergents such as soap cannot be rendered germicidal or bactericidal by incorporating therein small amounts of a hydroxy substituted aromatic hydrocarbon. Detergents of themselves are not effective against Staphylococci such as *Staphylococcus aureus*, and for purposes of this patent application the expression "antiseptic detergent composition" refers to those detergent compositions which are satisfactory detergents and which are effective against Staphylococci.

In accordance with this invention it has been found that 4,4' - (p - hydroxy benzylidene) - bis-(3-methyl-6-tert. butyl phenol),



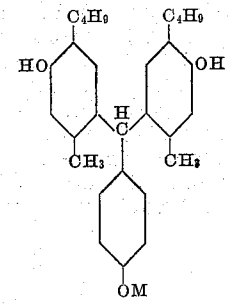

when admixed with a detergent composition in minor proportions forms a product exhibiting excellent antiseptic properties. This trihydroxy triaryl alkane is a lemon yellow crystalline solid (M. P. 263° C.) and is readily incorporated in detergent compositions whether the latter be solid or liquid. It is non-volatile and remains permanently in the detergent composition. It does not effect the lathering, cleansing or physical properties of the detergent composition and neither does it impart an unpleasant odor nor discolor the finished detergent composition. Furthermore the

2

new antiseptic detergent compositions are not irritating to the skin.

The trihydroxy triaryl alkane of this invention is a new chemical and is prepared by condensing substantially one molecular proportion of p-hydroxy benzaldehyde with substantially two molecular proportions of 6-tert. butyl-m-cresol (B. P. 130° C./20 mm.) in the presence of an acidic condensation catalyst.

The alkali metal derivatives of 4,4'-(p-hydroxy benzylidene)-bis-(3-methyl-6-tert. butyl phenol), as for example the sodium, potassium, and lithium salts, while not as effective as the parent compound, when admixed with a detergent composition also form a detergent product exhibiting good antiseptic properties. The most effective of this group are the mono-alkali metal salts, e. g.




where M is Na, K, or Li. These salts are conveniently prepared by simply treating the trihydroxy triaryl alkane with an aqueous solution of an alkali metal hydroxide and isolating the resultant mono-alkali metal salt. The di- and -tri alkali metal salts are formed by more drastic means, as for example refluxing the trihydroxy triaryl alkane with caustic and alcohol.

As exemplary of this invention 4,4'-(p-hydroxy benzylidene)-bis-(3-methyl-6-tert. butyl phenol) is compounded in a detergent composition and compared to several other detergent compositions containing hydroxy substituted polyaryl alkanes. The hydroxy substituted polyaryl alkanes listed below are incorporated in a "Ivory" brand neutral white high grade tallow soap to form 2% by weight compositions, that is a ratio of one part of hydroxy substituted polyaryl alkane to 49 parts soap. Aliquots of each are added to a nutrient agar medium so as to give concentrations to 1.25 p. p. m., 2.5 p. p. m., 5 p. p. m., and 10 p. p. m. of the hydroxy substituted polyaryl alkane in the nutrient agar. The agar in each case is then poured into a petri dish, allowed to harden and then is streaked with a 24 hour old culture of

*Staphylococci aureus* of standard resistance. The incubation in each case is made at 37° C. for 72 hours and the degree of growth is noted below:

TABLE

| Hydroxy substituted polyaryl alkanes | 10 p. p. m. | 5 p. p. m. | 2.5 p. p. m. | 1.25 p. p. m. |
|---|---|---|---|---|
| 4,4'-(p-hydroxy benzylidene)-bis-(3-methyl-6-tert. butyl phenol) | – | – | – | ½+ |
| 4,4'-methlene-bis-(3-methyl-6-tert- butyl phenol) (M. P. 179° C.) | +++ | 0 | 0 | 0 |
| 4,4'-(o-hydroxy benzylidene)-bis-(3-methyl-6-tert. butyl phenol) (M. P. 216° C.) | +++ | 0 | 0 | 0 |
| 4,4'-benzylidene-bis-(3-methyl-6-tert. butyl phenol) (M. P. 199.5° C.) | +++ | 0 | 0 | 0 |

Legend:
– no growth.
½ + extremely light growth.
+ very light growth.
+ + light to moderate growth.
+ + + normal heavy growth.
0 not tested.

Relatively small amounts of 4,4'-(p-hydroxy benzylidene)-bis-(3-methyl-6-tert. butyl phenol) in a detergent composition have been found to yield efficient antiseptic detergent compositions. Amounts as low as 0.5 to 1% by weight of this trihydroxy triaryl alkane or its alkali metal salts based on the weight of the detergent have proved satisfactory in some instances. However, it is preferred to employ amounts in the order of 1–3% by weight. While larger amounts may be employed as for example up to 10% by weight the upper limit used is determined by practical consideration. Other antiseptic agents may be incorporated as well as emollients, water softeners and the well known "vehicles" of the soap trade. Various colors, antioxidants, perfumes, and the like may be included where desirable.

The term "detergent" includes soap and synthetic detergents, particularly the anionic detergents such as the substituted amides and the alkyl aryl sulfonates. The term "detergent" includes also mixtures of synthetic detergents and soap. The term "soap" or "detergent soap" as



used herein is employed in its popular or ordinary meaning, that is, those cleansing compositions prepared from an alkali metal compound such as sodium or potassium hydroxide and a fat or fatty acid.

The trihydroxy triaryl alkane of this invention or its alkali metal salts may be added to the detergent composition in any suitable manner during the crutching or milling or similar operation. This trihydroxy triaryl alkane or its alkali metal salts may be first dissolved in a suitable solvent and then incorporated in the detergent if so desired. In general any method which results in the trihydroxy triaryl alkane of this invention or its alkali metal salts being uniformly incorporated in the final detergent composition is satisfactory.

While the invention has been described relative to several particular embodiments it is to be understood that it is not so limited but that many variations and modifications which are obvious to those skilled in the art to which this invention appertains may be made without departing from the spirit or scope of the invention.

What is claimed is:

1. An antiseptic detergent composition comprising a detergent soap and a minor weight proportion with respect to the detergent sufficient to impart antiseptic properties of 4,4'-(p-hydroxy benzylidene)-bis-(3-methyl-6-tert. butyl phenol).

2. An antiseptic detergent soap composition comprising a detergent soap and 0.5–10% of 4,4'-(p-hydroxy benzylidene) - bis - (3-methyl-6-tert. butyl phenol) based upon the weight of the detergent soap.

3. An antiseptic detergent soap composition comprising a detergent soap and 1 to 3% of 4,4'-(p-hydroxy benzylidene)-bis-(3-methyl-6-tert. butyl phenol) based upon the weight of the detergent soap.

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