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DISINFECTANT COMPOSITIONS

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This invention relates to disinfectant or antiseptic compositions. More particularly it relates to antiseptic compositions containing mixtures of bactericidal phenolic compounds and polyhalogenated phenolates.

Many phenolic compounds, that is aromatic compounds having a free hydroxyl group directly attached to the nucleus are known to possess germicidal properties of varying degrees of efficacy. Polyhalogenated phenols, such as pentachlorophenol, are also known to possess antiseptic properties see, for instance, U. S. Patent No. 2,698,301, dated December 26, 1954). In German Patent No. 649,172 mixtures comprising certain phenolic derivatives are described as having a synergistic bactericidal effect. It is well known, however, that phenolic compounds lose their antiseptic power in alkaline media. According to the aforesaid U. S. Patent No. 2,698,301 effective antiseptic detergent compositions can be prepared from detergent soaps and 0.5 to 5% by weight of a pentahalogenated phenol, such compositions being stated to be effective against Staphylococci. The pentahalogenated phenols are, however, substantially insoluble in water and to incorporate them in a detergent such as soap or an alkyl sulphonate, the pentahalogenated phenol is first dissolved in a suitable solvent. The water-solubility of the alkali metal phenolates increases with the alkali content but the germicidal activity thereof decreases correspondingly with the increased alkali content (see, for instance, E. Hailer in "Weyls Handbuch der Hygiene," 1922, vol. 8, page 1113). This decrease in germicidal power with increase in alkali content is true not only for monochlorinated phenols but also for polychlorophenols.

It is an object of the present invention to provide novel disinfectant or antiseptic compositions which comprise polyhalogenated phenols in water-soluble or readily dispersible form, that is in the form of water-soluble phenolates such as the alkali metal phenolates, such compositions having a high bactericidal or antiseptic power.

It has now been discovered that the polyhalogenated phenolates, especially potassium or sodium pentachlorophenolates, considerably increase the germicidal activity of bactericidally-active phenolic compounds in general, rather than decrease it as was to be expected and hence this surprising result permits aqueous, disinfectant solutions of phenolic compounds of high potency to be prepared.

In accordance with this invention disinfectant compositions are formed of mixtures of bactericidal phenols, including phenolic derivatives, and salts of polyhalogenated phenols with inorganic or organic bases, especially pentachlorophenolates, such as sodium or potassium pentachlorophenolates. The preferred disinfectant compositions of this invention comprise aqueous solutions of the phenolic mixtures and preferably include a surface-active agent, such as a soap or detergent, for example, a higher alkyl or aryl-alkyl sulphonate. Particularly effective disinfectant compositions of this invention comprise a mixture or two or more bactericidal phenols or phenolic compounds and a polyhalogenated phenolate, such as an

alkali metal pentachlorophenolate or pentabromophenolate. Thus effective disinfectant compositions may comprise mixtures of parachlorometacresol and also phenyl phenol in suitable relative proportions and conveniently in substantially equal proportions. Such a mixture of bactericidal phenols may then be mixed with suitable proportions of a polyhalogenated phenolate, the proportion of polyhalogenated phenolate varying from about 10% by weight of the bactericidal phenol or mixture of phenols to 200% by weight thereof or even more. However, it is economically convenient and effective as an antiseptic for the composition to contain one part of polyhalogenated phenolate per each 0.5 to 1.5 parts of bactericidal phenol, for example, substantially equal proportions of phenolates to bactericidal phenol or mixture theroef is a convenient and effective relative proportion.

The proportion of surface-active agent such as soap may be and preferably is a multiple of the proportion of bactericidal phenol in the mixture. Suitable proportions of soap may, however, vary from 5% by weight to 500% by weight of the bactericidal phenol in the composition. In a satisfactory disinfectant composition in accordance with this invention the proportion of soap or other surface-active agent is equal to 1.5 times the weight of bactericidal phenol in the mixture.

The composition preferably includes substantial amounts of water and in its preferred concentrated form it is a liquid composition in which the total dissolved solids amount to 5% to 75% by weight, the balance being water, a preferred range of total solids amounting to 30 to 75% by weight of the total mixture. Such solutions may be diluted many times to form effective disinfectants. The compositions of this invention may also include alkali such as sodium or potassium hydroxide or other water-soluble base, in amounts not in excess of the chemically equivalent proportion to convert the bactericidal phenols into phenolates, and preferably substantially less than the equivalent proportion, for example, about half the equivalent amount.

In the following examples, which are illustrative of this invention solutions are prepared of mixtures of bactericidal phenols with and without the inclusion of pentahalogenated phenolates, and the antiseptic power of the different solutions, when diluted, is compared in the subsequent tabulation. In the examples the parts are by weight. The soap used in Examples 1, 2 and 5 was prepared by saponifying castor oil with 4.4% by weight of potassium hydroxide in the presence of 10% methylglycol.

Example 1

6 parts para-chloro-meta-cresol,
6 parts ortho-phenylphenol,
18 parts soap,
made up to 100 parts with water.

Example 2

6 parts para-chloro-meta-cresol,
6 parts phenylphenol,
18 parts soap,
10 parts potassium pentachlorophenolate,
made up to 100 parts with water.

This mixture therefore differs from solution of Example 1 because of its potassium pentachlorophenolate content.

Example 3

5 parts parachlorometacresol,
5 parts orthophenylphenol,
1.7 parts sodium hydroxide,
50 parts of a fatty alcohol sodium sulphonate,
6 parts methylglycol,
made up to 100 parts with water.

Example 4

5 parts parachlorometacresol,
5 parts orthophenylphenol,
1.7 parts sodium hydroxide,
50 parts fatty alkyl sodium sulphonate,
10 parts sodium pentachlorophenolate,
made up to 100 parts with water.

This preparation differs from Example 3 because of its sodium pentachlorophenolate content.

Example 5

For comparison a solution was used consisting of:

18 parts soap,
10 parts sodium pentachlorophenolate,
made up to 100 parts with water.

The solutions set forth in the foregoing examples are in practice considerably diluted, as in the proportions of one part of solution to seven parts by weight of water.

A variety of diluted solutions were prepared from Examples 1 to 5 and under the same conditions, the effective limiting concentrations were ascertained in a suspension test, at a room temperature of 18° C. and a duration of action of five minutes. By depositing subcultures, a bacteriostasis overcoming true germicidal action was excluded. In the following table, the killing concentrations obtained are recorded.

Solution No.	*Staph. aureus*	*B. coli*
1	1:125	1:150
2	1:150	1:250
3	1:100	1:80
4	1:200	1:125
5	1:10	1:10

The tests clearly show that the addition of potassium pentachlorophenolate or the corresponding sodium salt to the disinfectant solutions Nos. 1 and 3, which according to their composition, are important in the trade as fine and coarse disinfectants (Ullmann, 3rd edition, vol. 5, page 760), causes a very significant increase in the efficiency of the phenol mixtures (containing free hydroxyl) which condition the disinfecting action, although it is shown by the test with preparation 5 that sodium pentachlorophenolate per se is practically without effect in the same proportion. A reduction of the limiting killing concentrations of preparations 2 and 4 by a value of 10. each, calculated on the species of germs *Staph. aureus* and *B. coli* might have been expected. However, a 100% increase in degree of efficiency of the disinfectant is obtained, as seen particularly by comparing preparations 3 and 4.

As germicidal or bactericidal phenols having free hydroxyl groups, those which are known to be satisfactory in the art of disinfecting are suitable for inclusion in the compositions of this invention, name, phenols, chlorophenols, chlorocresols, xylenols, chloroxylenols, phenylphenol, chlorophenylphenol, cyclohexylphenol, chlorocyclohexylphenol, benzylphenol, chlorobenzylphenol, dihydroxydiphenylmethanes, dihydroxy diphenylsulphides and dihydroxydiphenyl-oxides, and their cloro derivatives, resorcinol and its derivatives such as hexylresorcinol etc.

Suitable polychlorophenolates for inclusion in the compositions for this invention are the salts of polychlorophenols with alkali metals, ammonia, amines or other organic bases such as the salts of tri-, tetra- and pentachloro- or -bromo-phenols, tri- and tetra-chlorocresol, tetrachloroxylenol, tetrachloronaphthol and the like. The compounds of higher degree of chlorination show greater germicidal capacity than do the lower.

The disinfectans prepared according to the invention have in practice the same technical properties as have well known fine and coarse disinfectans of the kinds characterized by the examples. The solutions have good foaming properties, they are non-irritant to the skin etc. and have only a faint inherent odor and are versatile in use.

In the biological action the new preparations resemble those which have been used hitherto, except that a considerable increase in efficiency relative thereto is obtained. Infection exciters of all known kinds are destroyed with a short time and under the use of economic concentrations.

A meritorious feature of the invention resides in the possibility to achieve biological effects which go quite considerably beyond those known hitherto and in some cases result in an improvement in the known effect up to even as much as twice the original figure.

We claim:

1. A disinfectant composition comprising 5% to 6% of para-chloro-meta-cresol, 5% to 6% ortho-phenylphenol, 10% alkali metal pentachloro-phenolate and the balance of a surface-active agent and water.

2. The disinfectant composition of claim 1 which comprises 10% potassium pentachloro-phenolate, and 18% soap.

3. The disinfectant composition of claim 1 which comprises 10% sodium pentachloro-phenolate, 1.7% sodium hydroxide and 50% of a higher alkyl sulphonate.

4. A disinfectant composition comprising from 5% to 25% by weight of parachlorinated cresol and phenyl phenol, from 5% to 25% by weight of alkali metal polychlorinated phenolate, and the balance of a surface active agent and water.

References Cited in the file of this patent

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