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# UNITED STATES PATENT OFFICE

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## METHOD FOR THE PRODUCTION OF AQUEOUS SOLUTIONS

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10 Claims. (Cl. 167—31)

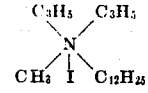
This invention relates to therapeutic and antiseptic compositions, and more particularly to their aqueous solutions.

Various substances have been suggested as agents for the preparation of aqueous dispersions of medicinal, pharmaceutical, therapeutic, and antiseptic preparations which are either difficulty soluble or insoluble in water. Soap and soap-like substances are usually used as dispersing or emulsifying agents for these preparations, but the resulting compositions are usually unstable, especially in hard water. Some dispersions are stable in certain concentrations but become unstable when these concentrations are varied. These aqueous dispersions are turbid and lose their efficiency on standing. Some of these agents have disinfectant properties of their own while others have no disinfectant properties of their own and may even impair the disinfectant properties of the compositions being dispersed. Where the dispersing agent has disinfectant properties per se, it frequently happens that the combined effect is less than that to be expected theoretically.

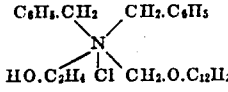
In accordance with application Serial No. 188,696, which has matured into Patent Number 2,264,150 dated November 25, 1941, comprising the invention of the instant applicant and another, cation-active quaternary ammonium compounds having higher molecular alkyl groups and being derived from non-saturated weak cyclic bases are excellent water solubilizing agents for medicinal, antiseptic and pharmacological compositions and particularly for phenols, phenol derivatives, camphor, rotenone, menthol, pyrethrines, vegetable extracts, and the like. Such quaternary ammonium compounds are, the alkyl-pyridinium hydroxides, and similar compounds, derived from quinoline, isoquinoline, pyrrole, anidine and the like, as well as their salts, halogenides, sulfates, nitrates, acetates, and the like. These quaternary ammonium compounds not only solubilize the foregoing insoluble or difficultly soluble compounds, but provide additional disinfectant properties to the resulting solutions. When combined with disinfecting agents, particularly those of the phenolic type, these water solubilizing agents retain all of their disinfectant properties without in any way impairing the efficiency of the phenols and the combined effect equals or exceeds the sum of the separate effects.

In accordance with the present invention, quaternary ammonium compounds having a higher molecular substituted or an unsubstituted aliphatic radical which may be interrupted by hetero atoms or hetero atomic groups, and which also have an unsaturated organic radical aliphatically bound to the nitrogen atom, are excellent water solubilizing agents for the aforesaid vermicides and germicides. The unsaturated organic radical may be either aliphatic or cyclic and in either instance the resulting compounds have the desirable characteristics of the quaternary ammonium compounds derived from weak bases. The solubilizing agents of the present invention are particularly suitable for use with difficultly soluble or insoluble antiseptic or therapeutic compounds and compositions, such as, phenols, phenol derivatives, camphor, and the like. The solubilizing characteristic of compounds having an unsaturated radical is surprising and unexpected because other quaternary ammonium compounds having higher alkyl groups but no unsaturated radicals, such as, for instance, trimethyl lauryl ammonium chloride, are incapable of producing clear, homogeneous mother solutions or dilute solutions with difficultly soluble or water insoluble antiseptic or germicidal solutions incorporating such compounds as chlorphenols, chlorcresols, chlorxylenols, O-butylated or o-benzylated p-chlorphenols, bis (halogen-hydroxy-aryl)-sulfides or oxides, and the like. Yet these compounds are soluble in the presence of the quaternary ammonium compounds of the present invention.

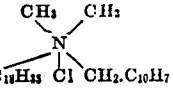
Various aliphatic and cyclic compounds are suitable as solvents in accordance with this invention, but quaternary ammonium compounds which contain at least one benzyl-, menaphthyl-, phenacyl, acetonyl, furfuryl, allyl, crotonyl or geranyl radical represent a preferred class. For instance, such compounds include methyl diallyl dodecyl ammonium iodide having the formula



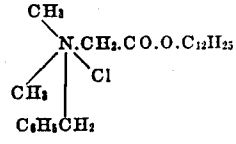
dibenzyl hydroxy-ethyl dodecoxy-methyl ammonium chloride having the formula



oleyl menaphthyl dimethyl ammonium chloride having the formula



dimethyl amino acetic acid dodecyl ester chlor benzylate having the formula



and others.

The following examples are included to illustrate the invention and are not to be interpreted as limitations thereon.

*Example 1*

Six and two-tenths grams of p-chlor-m-cresol, 28 grams of piperidino acetic acid dodecyl benzyl amide hydrochloride, 8.0 grams of alcohol and 71.8 grams of water form a clear solution. This solution may be diluted to any desired degree even with hard water, and will remain clear continuing to yield a true solution.

*Example 2*

Five grams of technical phenol (containing cresol) and 25 grams of dibenzyl hydroxy-ethyl dodecoxy-methyl ammonium chloride are dissolved in 70 grams of water. A clear solution is obtained which may be diluted to any desired degree.

Other clearing agents known to the soap industry, such as cyclohexanol and its homologues, glycerine and glycol ether, tetrahydrofurfuryl alcohol, and the like, may be used as an additional solvent instead of alcohol as shown in Example 1.

It should be understood that the present invention is not limited to the specific processes and compositions herein disclosed, but that it extends to all equivalent processes and compositions which one skilled in the art, upon adequate consideration of the state of the art and the tenor of the specification, would consider within the scope of the claims.

I claim:

1. A clear aqueous germicidal solution containing a phenolic disinfectant together with a quaternary ammonium compound having both a higher molecular aliphatic radical and an unsaturated organic radical each joined to the nitrogen atom, the unsaturated radical being aliphatically joined to the nitrogen atom, said disinfectant being present in the solution in a proportion which in the absence of said quaternary ammonium compound would not form a clear solution in water and said quaternary ammonium compound being present in a proportion which provides a clear solution in a dilute form ready for use.

2. A clear aqueous antiseptic solution containing a phenolic body and dibenzyl hydroxy-ethyl dodecoxy-methyl ammonium chloride, said phenolic body being present in the solution in a proportion which in the absence of the aforesaid quaternary ammonium compound would not form a clear solution in water and the aforesaid quaternary ammonium compound being present in a proportion which provides a clear solution in a dilute form ready for use.

3. A method for producing clear aqueous solutions of phenolic substances insoluble or difficultly soluble in water having an antiseptic disinfecting or pharmacological action, comprising admixing these substances in an aqueous liquid with an acyclic quaternary ammonium compound having both a higher molecular aliphatic radical and an unsaturated organic radical each aliphatically joined to the nitrogen atom, said phenolic substances being present in the solution in an amount which in the absence of the quaternary ammonium compound would not produce a clear solution and said quaternary ammonium compound being present in an amount which produces a clear aqueous solution when diluted in preparation for use.

4. The process of simultaneously increasing the water-solubility of disinfectants of the phenol-type while at the same time enhancing their disinfectant efficiency, which comprises incorporating in the mixture of water and a phenol disinfectant a quaternary ammonium compound having both a higher molecular aliphatic radical and an unsaturated organic radical each aliphatically bound to its nitrogen atom, said quaternary ammonium compound being employed in a quantity sufficient to, and which effects the formation of a clear dilute solution from the mixture which in the absence of the quaternary ammonium compound would not be a clear solution.

5. The method of producing clear aqueous solutions of disinfectants of the phenol-type, which comprises admixing the disinfectants in an aqueous liquid with a quaternary ammonium compound having both an unsaturated organic radical and a higher molecular aliphatic radical each aliphatically bound to the nitrogen atom, the quantity of the phenolic disinfectant being in an amount which in the absence of the quaternary ammonium compound would not produce a clear solution and the quantity of the quaternary ammonium compound employed being several times greater than the weight of the disinfectant used and sufficient to produce a clear aqueous solution when diluted with water in preparation for use.

6. The method of producing a clear aqueous solution containing conventional substantially water-insoluble organic substances of the phenolic type, which comprises incorporating into aqueous dispersions of said substances a quaternary ammonium compound containing both a higher molecular aliphatic radical and an unsaturated organic radical each aliphatically joined to the nitrogen atom, said phenolic substances being present in the resulting solution in a quantity which in the absence of said quaternary ammonium compound would not form a clear solution and said quaternary ammonium compound being present in a quantity in excess of said substances and sufficient to produce a clear dilute solution ready for use.

7. A clear aqueous solution containing a phenol and a quaternary ammonium compound having both a higher molecular aliphatic radical and a benzyl radical each joined to the nitrogen atom, said phenol being present in the solution in an amount which in the absence of the quaternary ammonium compound would not produce a clear solution and said quaternary ammonium com-

pound being present in an amount which provides a clear solution upon dilution with water to prepare the solution for use.

8. A clear aqueous solution comprising p-chlor-m-cresol and a quaternary ammonium salt, said quaternary ammonium salt having attached to its nitrogen atom a higher molecular aliphatic radical, a benzyl radical and a chlorine radical, said chlor-cresol being present in the resulting solution in a quantity which in the absence of said quaternary ammonium salt would not form a clear solution and said quaternary ammonium salt being present in a quantity which provides a clear solution in a dilute form ready for use.

9. A clear aqueous antiseptic solution containing a phenolic body and methyl diallyl dodecyl ammonium iodide, said phenolic body being present in the solution in a proportion which in the absence of the aforesaid quaternary ammonium compound would not form a clear solution in water and the aforesaid quaternary ammonium compound being present in a proportion which provides a clear solution in a dilute form ready for use.

10. A clear aqueous antiseptic solution containing a phenolic body and dimethyl amino acetic acid dodecyl ester chlor benzylate, said phenolic body being present in the solution in a proportion which in the absence of the aforesaid quaternary ammonium compound would not form a clear solution in water and the aforesaid quaternary ammonium compound being present in a proportion which provides a clear solution in a dilute form ready for use.

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