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PACKAGED GERMICIDES AND COMPOSITIONS

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This invention relates to packaged germicides and compositions for general germicidal purposes which may be packaged and utilized widely for general disinfecting, deodorizing, sanitizing, sterilizing and similar utilities.

Quaternary ammonium salts have been suggested for use for germicidal and insecticidal purposes. Exemplary of such compounds is cetyl - trimethyl - ammonium bromide commercially known as "CTAB" and the related derivative called "Ethyl CTAB." Such compounds while having valuable properties for germicidal purposes possess undesirable physical properties from the standpoint of merchandising in that they pack very tightly and become water-insoluble due to compression. Consequently they have been marketed in the form of solutions, as for example, solutions in water. Distribution of such liquids is unsatisfactory as a commercial proposition.

Among the objects of the present invention is the preparation of solid mixtures containing quaternary ammonium salts which do not pack in the sense of caking, and under ordinary compression do not become water-insoluble.

Further objects include packaged compositions of such quaternary ammonium compounds.

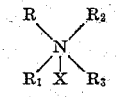
Still further objects and advantages of the present invention will appear from the more detailed description set forth below, it being understood that such detailed description is given by way of illustration and explanation only, and not by way of limitation, since various changes therein may be made by those skilled in the art, without departing from the scope and spirit of the present invention.

In accordance with the present invention the quaternary ammonium compounds are used in admixture with water-soluble, non-packing solid adjuvants which serve the purpose of preventing the quaternary ammonium compound from packing or caking so that the resulting compositions retain their desirable properties of being readily disseminated and dissolved in solvents such as water. Further, such compositions lend themselves to packaging and packages may be made of sealed containers containing any desired amounts of such compositions which being in dry form, may be readily distributed or shipped without difficulty. During such shipment they do not pack or compress or cake and are directly available without further preparation for solution in water or other solvent for use.

The quaternary ammonium compounds utilized for this purpose are more desirably the solid,

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water-soluble quaternary ammonium salts and related compounds possessing the desired germicidal or disinfecting or sterilizing properties. While the quaternary ammonium salts and related compounds may vary greatly and may be any of the organo group substituted quaternary ammonium salts and related compounds which may be generally formulated as follows



in which R is an organo group, R_1, R_2 and R_3 are either hydrogen or organo groups, and X is an anionic group. The organic groups may be aliphatic such as alkyl or olefinic, alicyclic and carbocyclic such as aryl or cyclo aliphatic, etc., as well as the stated organo groups containing substituents for example, the halogens such as chlorine, bromine, iodine, nitro groups, amino groups, carboxy groups, ether groups, etc. As exemplary of such organic groups there may be mentioned methyl, ethyl, propyl, butyl, lauryl, dodecyl, stearyl, allyl, phenyl, tolyl, benzyl and other aralkyl and alkaryl groups, cyclohexyl, acetonyl, hydroxy ethyl, oxy methyl, diethyl-beta hydroxy gamma butyl oxy propyl, thioethyl, glycido, geranyl, nitro-benzyl, trihydroxy ethyl, etc. The anionic group may be any salt forming group including the halides such as chloride, bromide and iodide, and other groups including the nitrates, sulfates, alkyl sulfates, phosphates, organic acid radicals, such as formates, acetates, lactates, tartrates, citrates, aryl sulfonic acids such as benzene sulfonate or toluene sulfonate, benzoates, salicylates, etc.

The tetra organo substituted quaternary ammonium compounds, that is, those compounds which contain four organo groups attached to the nitrogen are the preferred compounds utilized in accordance with the present invention and more particularly where one of the organo groups is a long chain aliphatic radical having more than 7 carbon atoms, such as the lauryl group referred to above or other of the higher groups and preferably one of the organo groups in the tetra substituted quaternary ammonium salts will be of that character, the other groups being either alkyl, aryl, aralkyl such as benzyl, etc. Preferably the chlorides or bromides are employed since they are readily available and these compounds will be utilized to illustrate the invention.

The water-soluble non-packing solid adjuvant which is employed desirably of non-hygroscopic

character may be inorganic and includes generally the water-soluble inorganic bases, acids, and salts, the salts employed being those which are either neutral, acid or basic salts, and particularly the salts of the alkali metals including sodium, potassium, ammonium, etc. Exemplary salts are those of the inorganic polybasic acids specifically carbonates, phosphates, borates, sulfates, sulfites and the like, illustrated specifically by sodium bicarbonate, trisodium phosphate, borax, sodium sulfate, sodium bisulfate, etc. Illustrative of the inorganic water-soluble bases are the caustic alkalies such as sodium hydroxide.

Water-soluble organic compounds may also be used to be mixed with the quaternary ammonium compound. They should be non-hygroscopic and must not pack or cake when mixed with the quaternary ammonium compound. They may be salts such as sodium acetate, etc., phenates such as sodium phenate, water-soluble amines such as urea, etc. In water solution they may be either acid or alkaline.

The proportions of the quaternary ammonium salt to water-soluble solid adjuvant may vary over wide limits depending on the nature of the quaternary ammonium salt and the solid adjuvant employed. All that is required is that there should be a sufficient amount of the non-packing or non-caking solid adjuvant in the mixture, to prevent the packing or caking of the quaternary ammonium salt. As a general rule the amounts employed will run from about 20% to 80% of quaternary ammonium salt to 80% to 20% of the solid adjuvant and ratios of 50% of quaternary ammonium salt to 50% of solid adjuvant may be readily utilized.

As pointed out above, the solid quaternary ammonium compounds are desirably employed. In some cases the liquid quaternary ammonium compounds may be utilized where admixture with the organic solid adjuvant gives a resulting solid composition that retains its property of readily distributing, disseminating, or dissolving in water or other desired solvent.

The resulting compositions may be dissolved in water or organic solvents at room temperatures or higher temperatures such as from 40 to 70° F. and used for germicidal or bactericidal or similar purposes. If desired, however, they may be utilized at higher temperatures as from 70° F. to 170° F. particularly where sterilization is desired.

Compositions produced as set forth above may be readily packaged by taking the solid mixture and placing it in any desired container such as a cardboard capsule which may be readily sealed. Such compositions may be shipped as desired and retain their desired physical properties, do not cake in the package, and do not lose their water-solubility.

The compositions thus produced are widely useful for general disinfecting, deodorizing, sanitizing and sterilizing. They may be utilized for solution in water to sterilize surgical instruments, sickroom tablewear, linen, and all kinds of apparatus and equipment where sterilization is desired, they may be added to various substances such as casein paints, glue, and other paste, powder and liquid products to which they give the preservative and deodorizing powers derived from the composition, only small quantities of the compositions are required for use in water for germicidal and similar purposes. Thus capsules or small cardboard containers containing such capsulated composition may be shipped and utilized in the manner set forth above. The contents of one such capsule may be dissolved in a gallon of water to give a concentrate and such concentrate may then be utilized for admixture with from 1 to 4 parts of water for general use for disinfection, deodorizing, etc. as set forth above.

As exemplary of specific compositions that may be utilized in accordance with the present invention there may be employed 50% cetyl-trimethyl-ammonium bromide with 50% sodium bicarbonate, by weight, or 50% "Ethyl CTAB" with 50% sodium bicarbonate. Or 60% of the stated quaternary ammonium compound may be used with 40% of sodium bicarbonate or of sodium acetate. Mixtures of organic and inorganic adjuvants may be made with the quaternary ammonium compound or compounds and used as set forth herein. The compositions may be mixed intimately in any desired way and then packaged in the manner set forth above.

Since the inclusion of the water-soluble non-packing adjuvant prevents the quaternary compound from packing and caking to a condition where it becomes water-insoluble, these compositions may be utilized together with necessary tableting adjuvants to produce tableted material which can be utilized for solution in water to make an odorless harmless germicide and deodorant for a variety of uses. With the non-caking or non-packing compositions as set forth above all that is required is that some solid adhesive material of the ordinary type employed for tableting purposes be incorporated into the composition to make the powdery materials adhere sufficiently to form a tablet under the pressures employed in the usual tableting machines and there is also desirably included a small amount of a mold lubricant particularly a solid mold lubricant commonly used for producing good tablets in such operations. As the solid adhesives that can be employed any of those normally used in tableting such as pharmaceutical compositions can be utilized and such solid adhesives are represented by the various starches including ordinary cornstarch, and the various gums and resins particularly solid water-soluble gums. As mold lubricants there are generally employed metallic soaps such as the stearates or other metal salts particularly alkali metal salts of the higher fatty acids. The adhesives may be present in the composition in amounts as desired and may run to 50% or more of the composition, while only a small amount of lubricant is necessary.

As exemplary of such compounds that may be formulated and converted into tablets for use in this way, the following is given. 5% ethyl cetyl dimethyl ammonium bromide, 40% bicarbonate of soda, 40% starch, and 5% calcium stearate. Another example is 15% ethyl cetyl dimethyl ammonium bromide, 60% sodium borate, 15% calcium stearate, 10% acacia pulvis. A further example is 20% ethyl cetyl dimethyl ammonium bromide, 5% propylene glycol, 75% sodium meta phosphate. A still further example is 25% ethyl cetyl dimethyl ammonium bromide, 70% disodium phosphate, 5% talc.

As a matter of fact some of the non-caking and non-packing compositions produced above may be tableted under sufficient pressures without necessarily including any adhesive and lubricant as set forth although the latter are desirably employed as indicated.

Having thus set forth my invention, I claim:

1. As an article of manufacture, a sealed con-

tainer containing ethyl cetyl dimethyl ammonium bromide which normally packs, in admixture with an amount of a water-soluble non-packing solid adjuvant selected from the group consisting of sodium bicarbonate and sodium acetate which prevents packing of the salt so that the ethyl cetyl dimethyl ammonium bromide remains readily water-soluble, and the ratio of ethyl cetyl dimethyl ammonium bromide to adjuvant being from 1:4 to 4:1.

2. The article of claim 1, in which the adjuvant is sodium bicarbonate, the materials being present in equal parts by weight.

3. The article of claim 1 in which the adjuvant is sodium acetate, the materials being present in equal parts by weight.

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