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STABILIZED GERMICIDAL TEXTILE SOFTENERS

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This invention relates to liquid laundry preparations and particularly it relates to highly stable aqueous combinations of cationic fabric softeners and germicides, and to processes for preparing them.

Numerous additives may be advantageously incorporated into textiles during laundering. Such additives include fabric brighteners, bluing dyes, optical brighteners, rewet agents and germicides. These additives may be incorporated by a padding process or by substantive laundering. In a padding process the additive is commonly dispersed or dissolved in a liquid medium at a suitable concentration based on the volume of the liquid, the fabric contacted with the liquid, and the liquid medium removed from the fabric by evaporation. Additives that do not display substantivity must ordinarily be incorporated into the fabric by padding which is usually costly and troublesome. Also, it is often difficult to obtain uniform distribution of materials applied by padding due to the fact that they are not attracted to the fabrics but are merely deposited upon the cloth during removal of the liquid medium.

Home and commercial laundering is generally performed on a substantive basis. The substantive additive, which has an affinity for the fibers of the fabric, is usually dispersed or dissolved in rinse or wash water at a suitable concentration based on the amount of fabric and irrespective of the water volume. Effective concentrations of the additive become bonded to the fabric even though the substantive additive is present in the water at relatively low concentrations.

Cationic fabric softeners are commonly dispersed in rinse water during laundering. Clothing rinsed in a fabric softener is faster drying, shows reduced wrinkling, is desirably fluffed or softened, and has improved anti-static properties. Cationic softeners, however, are only minimally effective as germicidal agents. Sanitizing treatment of clothing and textile is of recognized importance. Infections, such as those of *Staphylococcus* origin causing vexatious problems on institutions and hospitals, may be alleviated by use of proper germicidal laundering practices. In homes as well as institutions and hospitals, clothing, diapers and bed linens may be advantageously sanitized by treatment with germicides. Certain relatively water insoluble compounds such as organomercurial compounds have been found quite suitable as germicidal sanitizing agents in laundering, despite their toxicity at high concentrations. Textiles containing such germicidal salts effectively inhibit growth of pathogenic organisms.

For general use, liquid preparations of laundering additives are most convenient, rather dilute products generally being supplied for home use and more concentrated products supplied for commercial use. Ease of measuring and ready water miscibility are advantages inherent to liquid preparations. Fluidity of such products is an important quality feature, although such fluidity normally renders the preparations less stable. Such instability pre-

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sents serious manufacturing problems in that separation of substituents during distribution and use cannot be tolerated from either the esthetic or safety viewpoint. Settling of the heavy, insoluble organomercurial germicidal compounds may lead to the incorporation of excessive levels of germicide in clothing. Excessive quantities of the germicides in fabrics which are in intimate contact with body surfaces may cause severe toxic manifestations. Therefore, it is highly desirable to have available stable fluid preparations of germicidal liquid softeners in which settling-out of toxic substituents is minimized and held within acceptable limits.

The organomercurial germicides being only minimally substantive to textiles are difficult to uniformly distribute onto fabrics, thus making it ordinarily necessary to incorporate them by means of a padding process. We have found that organomercurial germicides dispersed in a fluid cationic textile softener preparation may be uniformly affixed to clothing in effective concentrations from a relatively dilute dispersion of the germicidal material. Cationic softeners are substantive toward fabric fibers and when combined with organomercurial compounds are attracted and bonded to the fibers in conjunction with the mercurial compounds, in effect rendering the germicides in the combination highly substantive toward fabrics being treated.

We have further discovered that by stabilizing the softener-germicide liquid preparations with minor portions of thin boiling cornstarch, which has no appreciably detrimental effect on the fluidity of the final preparation, the preparations may be rendered stable during storage and use, thus obviating separation difficulties and the danger of germicidal settling.

Consequently, it is an important object of this invention to provide highly stable liquid preparations for simultaneously and substantively sanitizing and softening fabrics. Other objects and advantages will appear as this specification proceeds.

To this end, and in accordance with our invention, there is provided a fluid colloidal preparation comprising at least one cationic fabric softener which is preferentially absorbed by cloth, at least one organomercurial germicide, and a minor portion of thin boiling cornstarch which is present at concentrations not appreciably affecting fluidity of the combination but at concentrations effective to cause the germicide to remain evenly dispersed throughout the colloid. The cationic softener exerts a potentiating effect upon the germicidal activity of the organomercurial compound as well as aiding in more uniform absorption of germicide onto fabrics.

Accordingly, in the practice of our invention a cationic fabric softener is dispersed or dissolved in water or other suitable liquid. Generally the cationic compounds which function as suitable textile softeners are quaternary ammonium compounds containing at least two alkyl chains having about 16 to about 22 carbon atoms in each chain, and which may contain ethylene oxide. Examples of such compounds include distearyltrimethyltriethoxyethanolammonium methyl sulfate, dimethyldihydrogenatedtallowquaternaryammonium chloride, stearyldialkanolalkylbenzylammonium chloride, and quaternized imidazoline compounds. Examples of commercially available softeners are those sold under the following trademarks: Arquad

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2HT, Softener 2-132, Aliquat 226, Adogen 442, Marquat-75 and Oversoft D. We prefer to use dialkyldimethylammonium chloride and optimally use the dimethyldistearyl quaternary ammonium chloride sold under the trademark Arquad 2HT.

Concentration of softener should optimally be sufficient to give a final concentration of about 0.05 to 0.3% softener based on weight of fabric to be treated. A water dispersible preparation containing from about 2% to 50% or 2 to 50 parts of active softener by weight is adequate for all types of usage. For individual use concentrations from about 2% to 8% active softener are preferred, while commercial laundries often prefer more concentrated products which are diluted before use. We prefer to have about 4% active softener in the final fluid preparation.

An organomercurial germicide is combined with a liquid preparation of softener. Although any organomercurial germicide may be used in our invention, we find that best results are obtained with phenylmercuric salts such as the acetate, butyrate, bromide, chloride, iodide, propionate, and the like. A concentration of 0.02 to 5 parts by weight is operable. We prefer to use a phenylmercuric salt in a ratio of about 1 part of salt to about 13 to 20 parts of cationic softener, although one part of salt per 10 to 100 parts of softener or 0.002 to 5 parts of the total composition may be used. Optimally, we prefer to use this ratio of phenylmercuric propionate in a dimethyldistearyl quaternary ammonium softener. Variations in concentration of germicide to softener may be optimally adjusted dependent on the molecular weight of the salt compared to the percentage of mercury in the salt.

The softener-germicide combination is incorporated into a colloid formed by modified starch which prevents separation of the combined substituents. We have found that thin boiling cornstarch which has been treated to reduce its fluidity, for example by acid modification or chlorination, will satisfactorily stabilize the compositions of this invention. We prefer to use acid modified cornstarch having a fluidity number of from about 5 to about 40. The grade, type and amount of cornstarch optimally suited to a specific combination varies to some degree. Sufficient cornstarch must be incorporated into the germicide-softener combination to adequately stabilize it for suitable periods of time while maintaining product fluidity in the range of about less than 500 centipoises. The colloidal concentration required is dependent to a substantial degree on the concentration of the softener. The concentration becomes critical when very dilute softener dispersions are prepared because of their tendency to be quite unstable. Use of a concentration of about 0.5 to 1.5% or 0.5 to 1.5 parts of starch by weight of the total formulation satisfactorily prevents precipitation of the organomercurial compound or salting out of the softener. We find that especially good results are obtained by using 0.5 to 1.5% or 0.5 to 1.5 parts of #20 acid modified starch in combinations containing about 4% active cationic surface active compounds.

The balance of the softener composition is water. About 43.5 to about 97.4 parts of water are required.

In preparing the compositions of this invention the starch should be added to water and boiled for several minutes to insure complete gelatinization. The melted cationic softener, preferably with the germicide dispersed therein, may then be added to the colloidal starch preparation. The germicide may be easily dispersed in the softener by mixing a slurry of the two ingredients with hexylene glycol. Additional ingredients such as rewet agents, dyes, perfumes and other optional additives may be added before or after the addition of the softener compound. Water soluble ingredients such as bluing dyes and brighteners should ordinarily be added before the softener. Alcohol soluble brighteners and like additives should ordinarily be added at the end of the dispersing operation.

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The following specific examples will serve to further illustrate our invention:

Example I

A typical home laundry preparation having the following formula by weight was prepared:

	Percent
Arquad 2 HT-75 ¹ -----	5.34
Calcofluor White M2R New (brightener dye)---	0.05
Hidacid Azure Blue 20-2204 (bluing dye)-----	0.0025
Phenylmercuric propionate-----	0.2
Acetic acid-----	0.1
No. 20 acid modified thin boiled starch---Amaizo TB-20 -----	1.0
Hexylene glycol-----	0.5
Water -----	Q.S.
Total -----	100

¹Trademark for dimethyldistearyl quaternary ammonium chloride manufactured by Armour and Company, 75% active ingredient.

Half of the required water was added to the starch which was dispersed in the water and boiled 5 minutes. Additional water was added to adjust the temperature of the gelatinized starch to about 150° F. The germicide was slurried in hexylene glycol and the softener dispersed in the slurry, the dispersion then being added to the starch mix. Water soluble brightener and the bluing dye were then added and after thorough mixing the remainder of the necessary water was added to bring the batch to even weight.

Example II

Using the procedure of Example I a softener-germicide combination having the following formula was prepared:

	Percent
Dimethyldistearyl quaternary ammonium chloride---	4
Hexylene glycol-----	0.5
Phenylmercuric propionate-----	0.2
Water -----	95.3

The viscosity of this preparation after thorough mixing was determined to be 40 centipoises when measured by means of a Brookfield viscosimeter. Within 24 hours after mixing, essentially all of the mercurial salt had been precipitated from the mixture.

A second preparation was prepared using the above formula, but having in addition 1% #20 acid modified cornstarch. Fluidity of the stabilized preparation measured 40 centipoises on a Brookfield viscosimeter. After 6 months storage no sediment was visible in the preparation; essentially all of the mercurial salt remained in suspension.

Example III

There may be employed in the compositions of this invention formulations similar to that of Example II except that phenylmercuric acetate is used instead of phenylmercuric propionate.

Example IV

There may be used in the compositions of this invention formulations similar to that of Example II except that phenylmercuric butyrate is used instead of phenylmercuric propionate.

Example V

There may be employed in the compositions of this invention formulations similar to that of Example II except that phenylmercuric chloride is substituted for phenylmercuric propionate.

Example VI

There may be employed in the compositions of this invention formulations similar to that of Example II except that stearyldialkanolalkylbenzyl ammonium chloride

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may be used as the softener instead of dimethyldistearyl quaternary ammonium chloride.

Example VII

There may be employed in the compositions of this invention formulations similar to that of Example II except that distearylmethyltriethoxyethanol ammonium methosulfate may be used instead of dimethyldistearyl quaternary ammonium compound.

Example VIII

There may be employed in the compositions of this invention a formulation similar to that of Example II except that a quaternized imidazoline compound may be used in place of the dimethyldistearyl quaternary compound.

While in the foregoing specification various embodiments of this invention have been described in considerable detail for the purpose of illustration, it will be apparent to those skilled in the art that this invention is susceptible to other embodiments and that many of these details can be widely varied without departing from the basic concept and spirit of the invention.

We claim:

1. A germicidal liquid fabric softener composition which is stable and substantive to fabric when dissolved in the wash waters of the fabric during laundering, said softener composition consisting essentially of about 2 to 50 parts by weight of a cationic fabric softener consisting of a quaternary ammonium compound having two alkyl chains of about 16 to 22 carbon atoms in each chain, one part by weight of a substantially water insoluble phenylmercuric salt per 10 to 100 parts of said

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fabric softener and 0.5 to 1.5 parts by weight of acid modified starch, the balance of said composition being water.

2. A germicidal fabric softener composition which is stable and substantive to fabric when dissolved in the wash waters of the fabric during laundering, said softener composition consisting essentially of about 2 to 50 parts by weight of a cationic fabric softener consisting of a quaternary ammonium compound having two alkyl chains of about 16 to about 22 carbon atoms in each chain, about 0.02 to 5 parts by weight of a substantially water insoluble phenylmercuric salt, about 0.5 to about 1.5 parts gelatinized acid modified cornstarch and about 43.5 to about 97.4 parts water.

3. The softener composition of claim 2 wherein said salt is phenylmercuric propionate.

4. The softener composition of claim 2 wherein said cationic softener is dimethyldistearyl quaternary ammonium chloride.

5. The softener composition of claim 2 wherein said cornstarch has a fluidity number of between 5 and 40.

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