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DETERGENT COMPATIBLE FABRIC SOFTENER

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ABSTRACT OF THE DISCLOSURE

A fabric softener composition which is compatible with either non-ionic or anionic detergents as well as cationic materials is disclosed. The composition comprises a combination of a cationic softener and a mono fatty trialkyl quaternary ammonium dialkyl phosphate.

The present invention relates to a novel fabric softener composition. In general, it concerns a fabric softener composition which is compatible with detergents. In particular, it pertains to a combination of a cationic softener and a mono fatty trialkyl quaternary ammonium dialkyl phosphate which combination has unique fabric softening properties.

At the present time, most fabric softener compositions contain a quarternary ammonium salt that is either water-soluble or water-dispersible as the active ingredient. These quaternary ammonium salts are strongly cationic surface active compounds and when used under the proper conditions, are absorbed on the surfaces of the fabric to produce a softening effect. In conventional fabric softener compositions employing cationic quaternary ammonium salts, and intended primarily for home laundry use, care must be taken to add the composition to the final rinse phase of the laundry cycle. If such a composition is added during the wash phase, i.e. in the presence of a strongly anionic detergent (which is the type used in most popular commercially available laundry detergents), the quaternary ammonium salt reacts with the detergent and produces a precipitate which does not give the cleaning action of the detergent, nor the softening action of the quaternary ammonium salt.

The advantages of a fabric softener composition which would be compatible with anionic detergents therefore are readily apparent. As used herein, the term "compatible" is used to define a fabric softener composition which, when added during the wash phase of the laundry cycle, in the presence of an anionic detergent, exhibits fabric softening properties and does not adversely affect the cleaning action of the detergent.

In the prior art, recent attempts have been made at preparing detergent compatible fabric softener compositions. However, heretofore these attempts have not resulted in a composition which exhibits all the properties required for a commercially acceptable product.

Accordingly, it is an object of the present invention to provide novel fabric softening compositions which are compatible with anionic detergents.

Another object of this invention is to produce a novel fabric softener composition which is compatible with both anionic and nonanionic detergents.

A further object of this invention is to prepare a fabric softener composition which may be employed at almost any point in the laundry cycle.

A still further object is to prepare an improved liquid fabric softener composition which may be employed at relatively low concentration levels, e.g. 1–4 fluid ounces per normal wash load.

A more specific is to provide a method whereby a housewife can launder and soften fabrics at the same time.

Other objects will be apparent to those skilled in the art from the disclosure that follows:

It has now been discovered that when certain cationic surface active compounds are combined, this unique combination is eminently suitable as the active ingredient for a detergent compatible fabric softener composition.

The novel combination of cationic surface active agents of the present invention comprises a cationic softener and a mono fatty trialkyl quaternery ammonium dialkyl phosphate.

The cationic softener employed in the combination is any fatty quaternary ammonium salt. Many such salts are generally known to the art for application to laundered goods. In general, these quaternary ammonium salts are composed of a strong base which includes a pentavalent nitrogen atom, and a strong acid. Four organo groups are attached to the pentavalent nitrogen atom. At least one, and usually two, of these groups are long chain hydrocarbon radicals, derived from corresponding fatty acids. The long chain hydrocarbon radicals may be of equal or unequal length and may differ in degree of saturation. Generally, the long chain comprises about 8 to 22 carbon atoms. The remaining organo radicals attached to the pentavalent nitrogen atom are usually methyl, ethyl, or hydroxyethyl groups. The anion portion of the quaternary ammonium salt is generally chlorine, bromine, sulfate, methosulfate, ethosulfate or the like. In some instances the cationic softener may be a complex mixture composed of several quaternary ammonium compounds. Examples of suitable cationic softeners include, but are not limited to, ditallow dimethyl ammonium chloride, ditallow dimethyl ammonium methosulfate, dialkyl ethoxylated hydroxy ethyl methyl ammonium chloride, 1-methyl-1-stearoylamido ethyl-2-heptadecyl imidazolinium methyl sulfate, ditallow ethyloxylated methyl ammonium methyl sulfate, and bis (2-tallow imidoethyl) methyl 2-hydroxyethyl ammonium methyl sulfate. Some of these cationic softeners are known to exhibit greater softening properties than others. The selection of any particular cationic softener will depend upon several factors including the economic availability. The only restriction upon the selection of a cationic softener imposed by the present invention is that when it is combined with the mono fatty trialkyl quaternary ammonium dialkyl phosphate, as further described hereinafter, and the combination is used as the active ingredient in a detergent compatible fabric softener composition, the composition should exhibit satisfactory softening properties when employed at a dosage level of about 2–3 fluid ounces per normal wash load.

A preferred cationic softener is manufactured by General Mills under the trademark "Aliquat 264" which is an aqueous alcohol concentrate containing about 75% difatty dimethyl quaternary ammonium chloride as the active material. The fatty groups are non tallow derived, but are long chain unsaturated fatty groups such as derived from soybean oil. This concentrate is a pourable liquid at room temperature.

The other component of the novel combination of cationic surface active agents employed in the present

invention is a mono fatty trialkyl quaternary ammonium dialkyl phosphate. The dialkyl radical may be dimethyl or diethyl (or mixtures thereof). The mono fatty radical contains about 14 to about 20 carbon atoms, and is generally derived from tallow. Such compositions are prepared for example, by reacting trimethyl phosphate, with a fatty tertiary amine. A preferred compound is mono fatty trimethyl quaternary ammonium dimethyl phosphate, where the fatty radical is derived from tallow and contains from 14 to 20 carbon atoms.

Both the cationic softener and the mono fatty trialkyl quaternary ammonium dialkyl phosphate are usually most readily available as concentrates in aqueous alcohol solutions. In general these concentrates will contain about 50 to about 75% active material, with the remainder of the concentrate being a low molecular weight alcohol, such as isopropanol, and water.

The relative proportions, by weight (on an active material basis), of the conventional cationic softener and the mono fatty trialkyl quaternary ammonium dialkyl phosphate should be in the range of about 1:1 to about 3:1 mono fatty trialkyl quaternary ammonium dialkyl phosphate to cationic softener. Relative proportions substantially outside this range will result in a combination which will not exhibit satisfactory softening properties. Preferably about equal weight amounts of cationic softener and mono fatty trialkyl quaternary ammonium dialkyl phosphate are employed.

As employed herein, the term "normal wash load" is intended to define the amount of laundry generally employed in a single load in a household washing machine. Usually such a load will weigh about 4 to 10 lbs., with a typical load being about 6 lbs.

Additional ingredients that do not contribute to the softening of fabrics, but do add other desirable properties to a fabric softener composition can be, and generally are, used in minor amounts with the compositions of the present invention.

Optical brighteners, for example, may be used in fabric softener compositions to improve the apparent whiteness or apparent brightness of the washed and softened fabrics. Such agents that are useful in this invention may be selected from the large number that are commercially available. One, or a combination of these optical dyes or brighteners, may be employed.

Perfumes may also be employed in the fabric softener compositions of the present invention to produce a more pleasing odor to the composition. Colorants, either pigments or dyes, may also be used. None of these additives are necessary to produce the compatible fabric softener composition of this invention and may be optionally included or omitted as desired.

To manufacture the composition of this invention, the cationic softener, the mono fatty trialkyl quaternary ammonium dialkyl phosphate, and the optional selected optical brightening agents are melted together at a temperature of from about 130° to 150° F. and stirred until thoroughly melted and mixed. In a separate container, the water and optional selected colorant are mixed and heated to a temperature of from about 105° to 120° F. The melt portion of the ingredients is then pumped into the water solution which is under sufficient agitation to form a homogeneous liquid dispersion. The fabric softener product is then cooled to a temperature of from about 90° to 100° F. after which the optional selected perfume is added and thoroughly mixed. The product, which is a liquid concentrate, is then ready for packaging into suitable containers.

As used herein, all parts and percentages are by weight, unless expressly stated to be otherwise.

The present invention may be further understood by reference to the following examples which are included for illustrative purposes only.

EXAMPLE I

A detergent compatible fabric softener composition of the present invention was prepared having the composition as follows:

	Percent by wt.
Mono fatty trimethyl quaternary ammonium dimethyl phosphate [1]	8.5
Difatty dimethyl ammonium chloride [1]	8.5
Optical brightener	.5
Optical brightener for synthetics	.2
Dye	.005
Perfume	.15
Water	82.145

[1] 8.5% of aqueous alcohol concentrate was used (concentrate contained about 75% active material).

The composition shown in Example I was tested in the wash phase of a laundry cycle to determine compatibility with anionic detergents as well as with nonionic detergents. The anionic detergent employed was "Tide," a commercially available detergent sold by Procter and Gamble Company, containing a blend of anionic detergents. The nonionic detergent employed was "Condensed All," a commercially available detergent sold by Lever Brothers Company containing nonionic surfactants as the active detergent component. The fabric softener composition of Example I was added at a concentration of about 3 fluid ounces per normal wash load.

In these tests, the detergent was added in the wash cycle. In some of the tests, fabric softener compositions were also added in the wash cycle, in others they were added in the conventional manner, i.e. to the final rinse cycle. Comparative tests were made using a commercially available medium concentration fabric softener (commercial softener "M") and a commercially available high concentration fabric softener (commercial softener "H"). The commercial softeners were employed at concentrations conforming to the manufacturers instructions. In these tests a softness rating of 5 is representative of zero softening while a rating of 1 is representative of the maximum expected softening provided by the most effective commercially available household fabric softeners. The results are shown in Table I.

TABLE I

Test	Wash cycle	Final rinse cycle	Softness rating
A	Anionic detergent		4
B	Anionic detergent and commercial softner "M."		5
C	Anionic detergent and fabric softner composition of Example I.		2
D	Anionic detergent	Commercial softner "M."	2
E	do	Commercial softner "H"	1
F	do	Fabric softner composition of Example I.	1
G	Nonionic detergent and fabric softner composition of Example I.		1

The results of Table I demonstrate the unexpected results obtained by means of the present invention. Test B demonstrates one of the problems that results when conventional fabric softeners are added to the wash cycle in the presence of an anionic detergent. In test B even less softening resulted than when the detergent alone was employed (test A). Test C exemplifies the present invention, showing a rating comparable to that obtained when conventional softener of medium concentration is added to the rinse cycle (test D). Test E shows that maximum softness can be obtained by using a high concentration commercial softener employed in the rinse cycle, but, of course, such a use does not satisfy the primary object of the present invention. Tests F and G also exemplify the present invention; both tests show maximum softness, test

F by employing the fabric softener composition in the rinse cycle and test G by employing the fabric softener composition in combination with a nonionic detergent in the wash cycle.

EXAMPLE II

A detergent compatible fabric softener composition of the present invention was prepared having the following composition:

	Percent by wt.
Mono fatty trimethyl quaternary ammonium dimethyl phosphate [1]	12.5
Difatty dimethyl ammonium chloride [1]	12.5
Water miscible organic solvent	2.0
Water	73.0

[1] 12.5% of aqueous alcohol concentrate was used (concentrate contained about 75% active material).

The composition of Example II contained butyl carbitol as a water-miscible organic solvent. When such a material is used a substantially clear composition of relatively high concentration of active ingredients may be prepared. Isopropanol, or other water miscible organic solvents may, optionally, be used. The fabric softener composition of Example II when added at a concentration of about 2 fluid ounces per normal wash load will give substantially the same softness ratings as shown in Table I for Fabric Softener Composition of Example I.

While the composition of the present invention will, in most instances, be added to the laundry cycle during the wash phase, that is, at the same time the detergent is added, it can be added at any latter stage of the cycle where water is present. Thus, for example, if the addition of fabric softener composition was inadvertently omitted during the wash phase it could be added during the intermediate or final rinse stage without any loss in softening effect.

It is apparent from the above that the present invention affords the housewife a simple method for cleaning and softening fabrics at the same time.

As is apparent from the above disclosure, the composition of the present invention is generally prepared as a liquid concentrate. This concentrate will generally comprise about 5% to about 25%, preferably about 12% to about 18% active ingredient (i.e. novel combination of cationic surface active agents on an active material basis) and about 92% to about 68%, preferably about 84% to about 75% water. This concentrate is a stable liquid and

is ready for use by the housewife at dosage levels of about 1 to about 4 fluid ounces per normal wash load.

Having thus provided a written description of the invention, along with specific examples thereof, it should be understood that no undue limitations or restrictions are to be imposed by reason thereof, but that the spirit and scape of the present invention is as defined by the appended claims.

What is claimed is:

1. A detergent compatible fabric softener composition consisting essentially of

(A) a cationic softener selected from the group consisting of

(i) ditallow dimethyl ammonium chloride,

(ii) ditallow dimethyl ammonium methosulfate,

(iii) 1-methyl-1-stearoylamido ethyl-2 heptadecyl imidazolinium methyl sulfate,

(iv) bis (2-tallow imidoethyl) methyl 2-hydroxyethyl ammonium methyl sulfate; and

(B) mono-fatty trimethyl quaternary ammonium dialkyl phosphate, wherein the mono-fatty radical contains from about 14 to about 20 carbon atoms, and the dialkyl radical is selected from the group consisting of dimethyl and diethyl; the ratio of said cationic softener to said mono-fatty quaternary phosphate being from about 1:1 to about 3:1, by weight.

2. The detergent compatible fabric softener of claim **1** wherein the mono-fatty trimethyl quaternary ammonium dialkyl phosphate is tallow trimethyl quaternary ammonium dimethyl phosphate.

3. The detergent compatible fabric softener of claim **2** wherein the cationic fabric softener is ditallow dimethyl ammonium chloride.

4. The detergent compatible fabric softener of claim **3** wherein ratio of said cationic softener to said phosphate is about 1:1, by weight.

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