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⑥④ **Fabric softening compositions containing clays.**

⑥⑦ Fabric treatment compositions containing a narrow class of clays, having a low ion-exchange capacity and a narrowly-defined surface area, in combination with conventional cationic agents are disclosed.

This binary combination can be incorporated into conventional textile treatment compositions inclusive of liquid, granular and substrate-like softening products. The technology is especially adapted for use in non-solid (liquid) compositions and is capable of providing unexpectedly improved benefits to the fibers treated therewith in a post-laundry operation.

FABRIC SOFTENING COMPOSITIONS CONTAINING CLAYS

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This invention relates to fabric treatment compositions comprising cationic fabric softeners and clays having a low ion-exchange capacity. In more detail, this invention relates to the utilization of conventional fabric softeners in combination with clays having a low ion-exchange capacity and a specific surface area to provide textile treatment benefits not achievable from conventional fabric-softener technologies containing cationic surface actives, if desired, in combination with "detergent" clays. The term "detergent" in this context refers to clays such as montmorillonites which are known to provide through-the-wash fabric benefits inclusive of softening. The technology herein can be embodied in various physical forms inclusive of liquid, paste and solid, and if desired, substrate-like compositions. The technology was found to be particularly beneficial for use in concentrated or conventional liquid rinse softeners.

The claimed compositions are capable of delivering enhanced softening performance as compared to what can be obtained from known fabric softener compositions. Another significant benefit originates from the dry, non-greasy, feel conferred by the claimed compositions as compared to a greasy-lubricated feel of textiles treated with conventional rinse softeners.

The clay compound can also provide desirable carrier properties for components which otherwise could not be effectively brought to the fiber to provide benefits e.g.



aesthetics which are permanent in between successive laundry treatments.

Background of the Invention

The use of clays in textile treatment, particularly cleaning compositions, is well-known and has found commercial application.

The use of water-insoluble detergent additives, inclusive of clays, can, based on the mechanism by which these additives exhibit their textile treatment functionality, arbitrarily be categorized in two distinct classes, namely those which derive intrinsic softness benefits from compression or slipping of clay-platelets lubricated by the water in the inter-layers having an ion-exchange capacity above 50 meq/100 g., and composite textile benefits derived from spherical particles which do not exhibit ion-exchange properties and which act by virtue of a quasi-"roller-bearing" effect.

The clay-platelet prior art is represented by a large number of publications, some examples of which are referred to below. The use of colloidal bentonites in synthetic detergent compositions, built or unbuilt, intended for the washing of hair, textiles, or hard surfaces, is known from British Patent n° 401,413, to Marriott.

British Patent n° 1.400.898, to The Procter & Gamble Company, also discloses the use of smectite-type clays in granular, built, laundry detergent compositions to provide through-the-wash fabric softening and/or anti-static benefits.

Comparable technology is also known from U.S. Patent n° 3.033.699, to du Pont de Nemours and Co.; it pertains to compositions and processes for improving antistatic properties of synthetic fibers with the aid of an aqueous suspension of a magnesium montmorillonite and colloidal silica.

U.S. Patent n° 3.886.075, to The Procter & Gamble Company, discloses the detergent utilization of particular

smectite clays and cationic antistatic agents, in combination with amino-compatibilizing agents, thus providing cleaning and other desirable benefits, inclusive of softening. Comparable disclosures are also known from European Patent Application n°80200878.9, to the Procter & Gamble Company; U.S. Patent n° 4.292.035, to The Procter & Gamble Company; and U.S. Patent n° 3.594.212, to General Mills, Inc..

The above clay-platelet state of the art is exemplified in the use of montmorillonites, smectites and comparable clays having significant ion-exchange capacities, as referred to above.

The water-insoluble additive art relative to particles having no ion-exchange capacity is represented by U.S. Patent n° 3.861.870, to The Procter & Gamble Company; it discloses a fabric softening composition containing a cation-active softening agent and substantially water-insoluble particulate materials which are free from exchangeable calcium and magnesium ions. The fiber-benefits are derived from the geometry and can be visualized as a quasi "roller-bearing" effect. The spherical geometry of the water-insoluble materials is defined with the aid of an anisotropy of from 5:1 to 1:1.

The clay-detergent prior art is silent and non-suggestive concerning the utilisation of clays in rinse softener compositions and further is, at least implicitly, possessed of the principle that low ion-exchange capacity clays such as kaolins would not deliver textile benefits comparable to e.g. detergent smectites.

It was now discovered that kaolin-type clays can deliver remarkable textile treatment benefits upon incorporation into rinse softener compositions containing cationic surface active agent. The benefits and the parameter limitations of the claimed technology are explained in more detail hereinafter.

Summary of the Invention

The present invention provides fabric treatment compositions which are capable of imparting desirable benefits to fabrics treated therewith. Such compositions usually contain:

- (a) from 50% to 99,5% by weight of a cationic fabric softener; and
- (b) from 0.5% to 50% by weight of a clay having an ion-exchange capacity from 2 to 35 meg/100g and a specific surface area from 2 to 100 m²/g, preferably 4 to 25 m²/g.

In a preferred aspect of the invention, liquid fabric rinse softener compositions are contemplated comprising from 2 to 25% by weight of the cationic fabric softener; from 0.1 to 10% by weight of the clay; and from 40% to 98%, preferably from 65% to 98%, by weight of a liquid carrier and conventional additives whereby the weight ratio of the cationic fabric softener to the clay lies in a range from 1:1 to 80:1, preferably from 2:1 to 25:1.

While the liquid executions are preferred, it is understood that the technology can equally be applied in combination with granular non-liquid treatment compositions as well as with treatment compositions which are deposited onto a water-insoluble e.g. sheet-like carrier for use in e.g. hot air dryers.

Unless indicated to the contrary, the "percent" indications hereinafter stand for "percent by weight". In the following description, the terms "fabric softener" and "textile treatment" are used interchangeably.

Detailed description of the invention

The invention herein relates to fabric treatment technology comprising, in its broadest scope, a binary ingredient combination, namely a cationic textile treatment agent, and a clay having a low and narrowly defined ion-exchange capa-

city and a relatively low specific surface-area. These main parameters as well as preferred and optimized executions of the invention are described and illustrated in more detail in what follows.

The Cationic Component - The cationic textile treatment component can be represented by all cationic surface-active agents which are known to be suitable for use in textile-treatment compositions and have found application in this field of technology. Particularly well-known in this respect are fabric softener/liquid textile treatment compositions for use in the rinsing step of an automatic washing machine operation.

The cationic component generally represents from 50% to 99.5% of the binary cationic fabric softener-low ion-exchange clay mixture. The individual ingredients are preferably employed in a weight ratio of cationic component:clay in the range from 1:1 to 80:1.

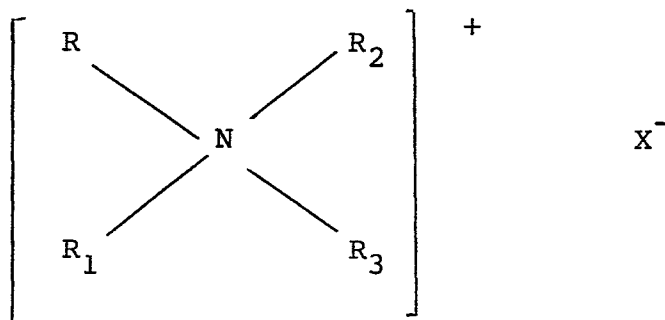
In the preferred liquid fabric treatment compositions herein, the cationic ingredient frequently represents from 2% to 25% whereby the weight ratio of cationic ingredient to clay is identical to the range referred to hereinbefore, namely from 1:1 to 80:1.

In one execution of the preferred liquid fabric softener compositions, the cationic fabric softener represents from 4% to 8% whereas in another preferred, and more concentrated, execution, the cationic ingredient represents from 12% to 18% of the liquid textile treatment composition.

The weight ratio of cationic fabric softener to low ion-exchange clays in the most preferred liquid softening compositions is in the range from 2:1 to 25:1.

Suitable cationic ingredients herein are known textile-treatment components. Many of the like ingredients have found commercial application. Generally, the cationic ingredient is a nitrogen-containing material such as quaternary ammonium compounds and amines and have one or two straight-chain organic groups of at least eight carbon atoms. Prefe-

rably, they have one or two such groups of from 12 to 22 carbon atoms. Preferred cationic components include the quaternary ammonium softener compounds corresponding to the formula:



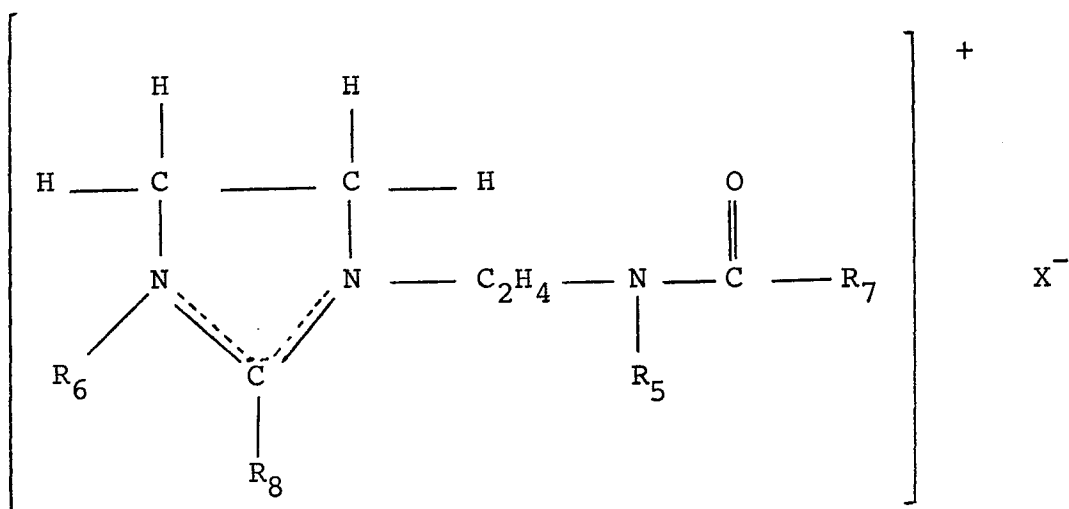
wherein R is hydrogen or an aliphatic group of from 1 to 22 carbon atoms; R₁ is an aliphatic group having from 12 to 22 carbon atoms; R₂ and R₃ are each alkyl groups of from 1 to 3 carbon atoms; and X is an anion selected from halogen, acetate, phosphate, nitrate and methyl sulfate radicals.

Cation-active amines, namely primary, secondary and tertiary amines having, at least, one straight-chain organic group of from 12 to 22 carbon atoms can also be used. A well-known example of diamines useful herein is tallow-N,N', N'-tris(2-hydroxyethyl)-1,3-propylenediamine. This diamine will be protonated depending upon the pH and qualifies as a cationic in the meaning of the claimed technology.

Preferred amines of this class are ethoxyamines, such as monotallow-dipolyethoxyamine, having a total of 2 to 30 ethoxygroups per molecule. A useful species of this class is C₁₆₋₁₈-alkyl-N-bis(2-hydroxyethyl)amines.

Other suitable cationic ingredients herein are the quaternary imidazolinium salts. Preferred salts are those conforming to the formula:

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wherein R₆ is an alkyl containing from 1 to 4, preferably from 1 to 2, carbon atoms, R₅ is an alkyl containing from 1 to 4 carbon atoms or a hydrogen radical, R₈ is an alkyl containing from 1 to 22, preferably at least 15, carbon atoms, R₇, an alkyl containing from 8 to 22, preferably at least 15, carbon atoms, and X is an anion, preferably methyl sulfate or chloride ions. Other suitable anions include those disclosed with reference to the cationic quaternary ammonium fabric softeners described hereinbefore. Particularly preferred are those imidazolinium compounds in which both R₇ and R₈ are alkyls of from 12 to 22 carbon atoms, e.g., 1-methyl 2-tallow 3-tallowamidoethyl imidazolinium methosulfate.

Other cationic quaternary ammonium fabric softeners, which are useful herein include, for example, alkyl (C₁₂ to C₂₂)-pyridinium chlorides, alkyl (C₁₂ to C₂₂)-alkyl (C₁ to C₃)-morpholinium chlorides, and quaternary derivatives of amino acids and amino esters.

The cationic fabric softeners mentioned above can be used singly or in combination in the practice of the present invention.

The Clay Component - The essential clay component is present in the compositions of the invention at levels from 0.5% to 50%. In the liquid formulation aspect of the invention, the

clay is used in an amount from 0.1% to 10%, which amount varies depending upon the level of the cationic textile treatment agent.

In one preferred liquid formulation containing from 4% to 8% of the cationic fabric softener, the clay represents from 0.1% to 0.5%, whereas in a more concentrated liquid execution containing from 12% to 18% of said cationic fabric softener, the clay ingredient can represent from 0.5% to 3.5%.

Clays generally are essentially alumino-silicates which can be crystallized in a variety of mineral structures.

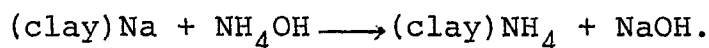
They differ in chemical and physical properties, like cation-exchange capacity and specific surface area.

Clay minerals usually contain besides the alumino-silicate hydrous silicates of less abundant metal elements, inclusive of Mg, Fe and others. They are crystallized in layer structures. Their operability for use in the instant compositions is defined via:

- (1) an ion-exchange capacity from 2 to 35meq/100 g.; and
- (2) a specific surface area from 2 to 100 m²/g., preferably 4 to 25 m²/g.

Clay minerals can carry an excess of negative electric charge owing to internal substitution by lower valent cations. The exchangeable cations are held by weak electrical forces and are more or less easily replaceable by others. No structural change in the mineral is involved as a result of the exchange. The ion-exchange is stoichiometric in nature, namely for each cation taken up from the medium, an equivalent amount of ion is released into the medium.

The cation-exchange capacity is measured in terms of milliequivalents per 100 g. of clay. This is done with the aid of well-known techniques, such as: electrodialysis; exchange with ammonium ion followed by back titration; or the methylene blue procedure. A typical cation exchange reaction may be expressed as follows:



The ammonium ion back titration is frequently used and can be carried out in accordance with the operational mode in "The Chemistry and Physics of Clays", Interscience, 1971, pages 264-265.

The ion-exchange capacity of the clays herein is in the range from 2 to 35 meq/100g. These clays can, in fact, be termed as "low-ion-exchange" clays.

It is believed that the relatively low surface-charge as compared to e.g. montmorillonite varieties, generates an optimized clay-cationic coaction to provide unexpected fiber benefits. The like benefits are not achievable in the event the cationic softener is strongly linked to clays such as e.g. montmorillonites having relatively higher surface-charges.

The specific surface area is the geometrical surface area per unit of volume. The method usually applied for the determination of this parameter is that proposed by Brunauer, Emmett and Teller, disclosed in "Physical and Chemical Aspects of Absorbents and Catalysts", Academic Press, 1970, p 21, 22, 23. It is known as the BET Method; the data are generated via the adsorption of nitrogen on solid substances.

The particular shape of the clays of the invention leads to a low surface-to-volume ratio, i.e., a low specific surface area.

The clay can, therefore, be more completely surrounded by cationics, and possibly spherical particles are formed, which can easily deposit onto the fabric. The clay component herein has a specific surface area from 2 to 100 m²/g., preferably from 4 to 25 m²/g.

Clay species particularly suitable for use herein include: kaolin, illite clays such as muscovite and mica, talc, and mixtures of these clays.

Another useful property of the clays herein is that they can serve as carrier for optional substances that, in the context of prior art fabric softener technology, could not be effectively deposited onto the fabrics from an aqueous rinse in part because these compounds are quite soluble in water.

These optional components usually serve to augment and improve known fiber benefits and include, for instance, short chain di- or polyfunctional alcohols such as glycerol or ethylene glycol, short chain amines such as triethanolamine, and hydrophilic polymers, e.g., polyethylene glycol, polyethyleneimine. Generally these compounds provide good softness properties to cotton fabrics if applied directly to the fabrics by a spray-on technique, or by immersing the fabrics in concentrated solutions of said compounds. They could up to now not be effectively deposited onto fabrics under conventional rinse conditions. Clays are known to form complexes with compounds of the type mentioned above, some of these complexes are described, for instance, in "The Chemistry of Clay Organic Reactions" by B. & C. Theng, A. Hilger 1974. In these complexes the organic compounds are believed to be adsorbed between the layers of the clay material. In this way these organic compounds can be deposited together with the clay to the fabrics where the optional component will exhibit the particular benefits. The weight ratio of clay carrier to component deposited thereon is preferably in the range from 1:5 to 6:1, most preferably from 1:2 to 1:1.

The clay can also help the fabric deposition of other materials such as perfume, germicidal agents and other optional components for fabric softener compositions which (optionals) are usually present in sub-additive levels e.g. below 2%.

The carrier combination i.e., the clay and the optional component deposited thereon, are prepared separately, i.e., before being incorporated into the claimed compositions, by known means inclusive of mixing the additive and the clay.

Optional Ingredients - The compositions of this invention can contain, in addition to the essential components described in more detail hereinbefore, all kind of matrix ingredients, compatibilizing agents and optional performance additives with a view to facilitate the utilization of the technology by e.g. the housewife, to enhance and facilitate the industrial processing of optimized executions, and also

to augment and improve desirable performance benefits. The like additives and optional ingredients are represented by well-known ingredients and ingredient mixtures, which are used for their known functionality in the art established levels. Non-limiting examples of useful optional ingredients are listed hereinafter.

The compositions herein frequently comprise inert matrix ingredients, fillers and/or liquid carriers. Matrix ingredients/fillers can generally comprise all neutral liquid or solid, frequently inert extenders, such as sodium sulfate, saccharose and possibly mixtures of polyphosphates and sodium-sulfate. In the liquid execution herein, the binary active system is stably incorporated and/or dispersed and/or suspended with the aid of from 40% to 98%, preferably 65% to 98% of a liquid carrier and additives. Suitable liquid carriers comprise water, lower aliphatic alcohols, especially ethanol, isopropanol, n-propanol, propanediol, hexanol, hexylene glycol, pentanol, isobutanol, as well as aromatic alcohols, like phenoxyethanol, benzyl alcohol, phenylethylalcohol, C_{1-18} -alkyl phenols ethoxylated with 2 moles of ethylene oxide, and mixtures thereof.

In order to increase the solubility of the cationic ingredient in the organic solvents, aromatic adjuncts could be added; preferred adjuncts of the acid, ester, ketone or phenol types include benzoic acid, m-chlorobenzoic acid, p-toluic acid, hydrocinnamic acid, salicylic acid, benzyl benzoate, benzyl salicylate, trichlorophenol, benzophenone, benzene sulfonic acid and C_{1-18} -alkyl benzene sulfonic acid.

In addition to the cationic textile treatment agent, the compositions can also contain nonionic fabric softeners such as those described in German Offenlegungsschrift 26 31 114, preferably fatty acid esters of polyhydric alcohols having up to 8 carbon atoms. Examples of the like esters include sorbitan esters and glycerol esters such as sorbitan mono-stearate, sorbitan monooleate, glycerol mono-di- and tri-fatty acid esters wherein the acid is selected from stearic, oleic, lauric, capric, caprylic, caproic, valeric, butyric,

propionic and acetic acid; an individual glycerol can be esterified by identical fatty acid groups or by mixed esters e.g. glycerol monostearatedioleate. Polyethyleneglycol esters of fatty acids such as monooleate, dioleate, monolaurate and monostearate, wherein the polyethyleneglycol moiety has a molecular weight in the range from 200 to 400 are also included in that class. Fatty acid esters of monohydric alcohols having at least 4 carbon atoms such as isobutyl stearate and ethyl hexyl stearate can also be useful.

Additional nonionic fabric softeners which can be used are: glycerol, diglycerol, ethylene glycol, propylene glycol, diethylene glycol, dipropylene glycol, dihexylene glycol, polyethylene glycol (MW 200-100.000), polypropylene glycol (MW 200-100.000), polyvinylalcohol, polyoxyethylene-polyoxypropylene copolymers, polypropylene glycol (MW 900), glucose methylether, butyldiglycolether, diethyleneglycol-monobutylether, propyleneglycolmonoethyl or ethyl ether, ethylene carbonate, propylene carbonate.

Alkylpolyglucosides of the general formula $R^2O(C_nH_{2n}O)_t$ (glucosyl)_x wherein R^2 is alkyl, alkylphenyl, hydroxyalkyl, hydroxyalkylphenyl and mixture thereof wherein the alkyl chain has from 8 to 18 carbon atoms, t is from 0 to 2 and x from 2 to 7, can also be used in the composition. These glucosides exhibit desirable solvent properties and in addition can confer fiber benefits such as softness.

Lanolins and derivatives and paraffins having from 16 to 30 carbon atoms constitute another example of non-ionic softeners which can be used if desired.

Low melting oils from animal, vegetable or mineral origin are representative of this class of softeners. Carnation oil^R, Jojoba oil^R and Sunflower oil are specific examples which are found to work.

Other optimal ingredients for improving the textile softness can be selected from mono-, di- and triethanolamine, triethanolaminemono-, di- and triglycolether, hydrochloro-salts of the above amines, polyethyleneimine, N-alkyl polyethyleneimine and N-alkylamine oxides, ethoxylated poly-

functional amines such as polyethoxytetraethylene pentamine (90 times ethoxylated).

The like nonionic textile treatment agents, can be used in liquid softener compositions in levels which do not exceed the level of cationic textile treatment agent.

The liquid compositions herein can also contain viscosity control agents such as calcium chloride and/or magnesium chloride at levels of from 100 to 2000 ppm.

The compositions may contain silicones such as described in German Patent Application DOS 26 31 419. These materials can provide further benefits inclusive of ease of ironing and anti-wrinkling. The optional silicone component can be used in an amount of from about 0.1% to about 4%, preferably from 0.4% to 3% of the softener composition. Preferred silicones include aminosubstituted silicones, cationic silicones and non-substituted polydimethylsiloxanes. The silicone ingredient is frequently represented by a pre-emulsified silicone whereby the emulsifier can be represented by all kind of ionic and nonionic species. Highly ethoxylated fatty acid esters is one known class of suitable emulsifiers.

Other optional ingredients for use in the inventive compositions include emulsifiers, perfumes, preservatives, germicides, dyes, bactericides, stabilizers, brighteners, opacifiers, photoactivators, copolymeric carboxylates having sequestering properties, soil release agents, bleaches, bleach activators, and anti-yellowing agents. These additives are normally incorporated at their conventional low levels e.g. from about 0.001% to 5%.

Suitable preservatives are frequently used in levels from 0.001% to 0.3% and can be represented by 2-nitro-2-bromopropane-1,3-diol, glutaraldehyde, and 2-methyl-4-isothiazolin-3-one and its chloro-derivative.

Photoactivators such as sulfonated-Zn-phthalocyanine and those disclosed in European Patent Application 79200012.7 can be used in e.g. levels from 10 ppm to 2000 ppm.

Copolymeric carboxylates derived from maleic anhydride and (meth)acrylic acid as e.g. disclosed in European Patent Application 80200602.9 and European Patent 0 025 551 can be

used in e.g. levels from 0.2% to 5%.

The compositions herein can further contain a detergent oxygen-bleach e.g. sodium perborate tetrahydrate, sodium perborate monohydrate, sodium percarbonate and mixtures thereof in amount from 0-40%. Organic sequestering substances, carrying polycarboxylate groups, e.g., citric acid, can optionally be used in levels from 0% to 20%. Organophosphonate sequestrants, such as ethylenediaminetetramethylene phosphonic acid, diethylenetriaminepentamethylenephosphonic acid, ethylaminodimethylenephosphonic acid and the alkali and/or earthalkali salts of these organophosphonate sequestrants can also be used, preferably in levels from 0-3%. Detergent enzymes such as amylases, proteases, lipases and mixtures thereof can also be incorporated in levels from 0% to 2%.

The compositions herein can also contain anionic surface-active agents such as sulfonated and sulfated synthetic organic surfactants; these anionic detergents can represent from 0% to 20% of the final composition.

Nonionic and/or semi-polar surfactants can also be used in levels from 0% to 20%. Suitable semi-polar detergents include amine oxides.

Depending upon the exact formulation parameters of a given product execution, the sum of matrix ingredients, solvents, additives and other optional ingredients can vary over a very broad range e.g. from 0% to 98%.

While a major illustration in the context of this invention is directed to aqueous based liquid rinse added softener, it is understood that the combination of low ion-exchange clay and cationic can also be utilized in delivering a fabric conditioning effect via other ways of incorporation. In all cases the broad range of clay/cationic combinations still apply although the preferred ratios of clay to cationic and choice of type and level of additives will depend on the form of the softening agent and its desired physical and chemical properties. Some examples of alternative forms of the clay/cationic softening agent are as follow (not in any way meant to be all encompassing),

1. A granular or powdered composition of this invention can be produced by, for example spray cooling/drying, granulation, agglomeration or extrusion. This execution can for example be added directly into the final rinse or predispersed in water before use in which case dispersibility is a key desired attribute. Alternatively the softening agent may be delivered in combination with normal granular detergent ingredients such as surfactant, builder, suspending agent, bleach, perfume etc. delivering its softening effect "through-the-wash". In all granular forms, a key criteria is to maintain the product free flowing at all times and is generally achieved when the clay/cationic with optional additives, has a softening point above normal room temperature, normally above 30-35°C.

2. A substrate execution where the softening composition is impregnated in or coated onto non-woven or foam substrates or contained within a pouch or sachet.

In the case of a substrate, the product can be added via the wash or into the hot air clothes dryer. Product characteristics are chosen to give a good balance between non-greasy/non-sticky product feel and good release in the wash/dryer.

In the case of product contained within a pouch or sachet, the key product characteristic desired is dispersibility with the release behaviour controlled by the material or sealing of the pouch/sachet. Examples of the substrate are non-woven polyester or rayon with wood pulp, of the foam-polyether or polyurethane and of the pouch - polyvinyl acetate.

By way of illustration, ingredient ranges for solids and substrate executions herein are as follow:

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<u>INGREDIENT</u>	<u>% BY WEIGHT RANGE</u>
- Binary active mixture	10 - 99
consisting of: - clay 10-50%	
- cationic fabric softener 90-50%	
- Additives and processing aids	90 - 1
inclusive of: - sodium sulfate 0-70%	
- tripolyphosphate 0-20%	
- polyethylene glycol 0-10%	
- copolymer of maleic anhydride and (meth)acrylic acid 0-10%	
- brightener 0-5%	
- aesthetics 0-5%	
- photoactivator 0-1000 ppm	
- germicide 0-2%	
- sodium perborate 0-40%	
- citric acid 0-20%	
- enzyme 0-2%	
- anionic surfactant 0-20%	
- nonionic and/or semi-polar surfactant 0-20%	
- organophosphonate sequestrant 0-3%.	

EXAMPLE I

A concentrated liquid fabric softener was prepared having the composition listed hereinafter. The ditallowdimethyl ammonium chloride was molten and, at 65°, mixed with the imidazolinium material, the ethoxylated amine, the phosphoric acid and the kaolin. This premix was injected, under vigorous stirring, in a waterseat having a temperature of about 60°C.

<u>Ingredients</u>	<u>Parts by weight</u>
Ditallowdimethylammonium chloride	13
1-Methyl 2-tallow 3-tallowamidoethyl imidazolinium methosulfate	3
Monotallow di (polyethoxy) amine *	0.5
Kaolin **	1.5
Phosphoric acid	0.1
Water, CaCl ₂ and minor ingredients	balance to 100

* containing in total 20 ethoxy-groups.

** having an ion-exchange capacity of 6 meq/100 g. and a specific surface area of 14 m²/g.

The above composition was easily pourable, at ambient temperature, after preparation and after prolonged storage. It showed excellent phase stability and homogeneity after a one month storage at room temperature.

This composition, upon use in the rinsing step of an automatic washing machine, was found to impart superior textile softening properties compared to what was obtained from a conventional, non-kaolin-containing rinse softener.

Comparable results are obtained by the replacement of the kaolin in the above formula by an equivalent level of an illite clay, selected from:

- mica : having an ion-exchange capacity of 19 meq/100 g.
and a specific surface area of 4 m²/g.
- muscovite : having an ion-exchange capacity of 25 meq/100 g.
and a specific surface area of 5 m²/g.

Substantially identical textile benefits are also secured by the replacement of the kaolin in the above composition by an equivalent level of talc, having an ion-exchange capacity of 2.4 meq/100 g. and a specific surface area of 17.6 m²/g.

The following compositions were prepared as described in Example I.

<u>INGREDIENTS</u>	Composition in parts by weight							
	Comp. A	Ex. II	Comp. B	Ex. III	Comp. C	Ex. IV	Ex. V	Comp. D
Ditallowdimethylammonium chloride	13	13	13	13	13	13	13	13
1-Methyl 2-tallow 3-tallowamido-ethyl imidazolinium methosulfate	3	3	3	3	3	3	3	3
Monotallowdi (polyethoxy)-amine *	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Kaolin (1)		1.5		0.75		1.5	1.5	
Bentonite (2)					0.75			
Triethanolamine hydrochloride	3	3		1.5	1.5			
Polyethyleneglycol (3)						1.5		
Glycerol							1.5	3.0
Phosphoric acid	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Water & Minor additives	balance				to 100			

* containing in total 20 ethoxy-groups.

(1) having an ion-exchange capacity of 6 meq/100 g and a specific surface area of 14 m²/g.

(2) having an ion-exchange capacity of 70 meq/100 g and a specific surface area of 600 m²/g.

(3) having a molecular weight of 6000-12.000.

The above compositions were evaluated thereby using the following softness test:

A bundle of mixed fabrics and terry cotton test swatches was washed in a commercial washing machine, with detergent in

the washing cycle, and subsequently rinsed thereby using 40 grams of the liquid softening composition followed by line drying. The softness of the terry cotton swatches so treated were comparatively measured. The softness difference between the various swatches was evaluated on 4 replicates, in paired comparisons, by 2 expert judges thereby using a 0-4 scale (psu) whereby:

- 0 means : there is no difference
- 1 means : I think there is a difference
- 2 means : I know there is a difference
- 3 means : I know there is a big difference
- 4 means : There is a very large difference.

The composition of Example II was found to be significantly superior as compared to prior art Composition A.

	Softness Performance (psu)
Composition A	Reference
Example II	+ 1.0

Other comparisons referring to the listed compositions gave the following results:

	Softness performance (psu)	Least Significant difference L.S.D.
- Composition B	Reference	-
- Example I	+ 0.3	0.2
- Example III	+ 0.5	0.4
- Composition C	- 0.1	-
- Example IV	+ 0.3	0.3
- Example V	+ 0.5	0.2
- Composition D	- 0.1	-

. The testing evidence shows that the compositions of the invention provide remarkable softening benefits compared to prior art softening compositions containing no clay or quasi-art executions containing a bentonite clay.

Another series of concentrated liquid fabric softeners having the compositions given hereinafter are prepared.

<u>INGREDIENTS</u>	<u>Parts by weight</u>					
	Ex. VI	Ex. VII	Ex. VIII	Ex. IX	Ex. X	Ex. XI
Ditallowdimethylammonium chloride	15	13	13	14		10
1-Methyl(2-hydrogenated tallow)3-tallowamidoethyl imidazolinium methosulfate		3	3	2		
Monotallow di (polyethoxy) amine *		0.5	0.25	0.5		
Kaolin (a)	3.0				1.5	1.5
Muscovite (b)			1.5	0.75		
Talc (c)		0.75				
1-Methyl(2-tallow)3-tallowamidoethyl imidazolinium methosulfate					15	
Dicocoyl dimethylammonium chloride						5
Water and minor ingredients	balance to 100					

* containing in total 20 ethoxy-groups.

(a) having an ion-exchange capacity of 6meq/100 g and a specific surface area of 14 m²/g.

(b) having an ion-exchange capacity of 25meq/100 g and a specific surface area of 5 m²/g.

(c) having an ion-exchange capacity of 2.4meq/100 g and a specific surface area of 17.6 m²/g.

The compositions of Ex VI, Ex VII and Ex VIII were tested and were found to exhibit excellent textile treatment benefit as compared to conventional liquid treatment softeners.

Further examples of the invention are formulated having the compositions indicated below.

INGREDIENTS	Parts by weight						
	Ex. XII	Comp. E	Ex. XIII	Ex. XIV	Ex. XV	Comp. F	Ex. XVI
Di-tallowdimethylammonium chloride	15	13	13	15	13	10	12
1-Methyl(2-tallow)3-tallow-amidoethyl imidazolinium methosulfate		3	3		3	5	2
Monotallowdi (polyethoxy) - amine *		0.5	0.5		0.5	1	0.25
Kaolin (a)	1.5			1.5	3		0.75
Muscovite (b)			0.75				
Glycerol	1.5	0.75				2	10
Polyethylene glycol			1.5				
Triethanolamine		1.5				2	
Glycerol monocaprates				1.5			
Ethylene carbonate					1.5		
Water and minor ingredients	balance to 100						

* containing in total 20 ethoxy-groups.

(a) having an ion-exchange capacity of 6meq/100 g and a specific surface area of 14m²/g.

(b) having an ion-exchange capacity of 25meq/100 g and a specific surface area of 5m²/g.

CLAIMS

1. A fabric treatment composition comprising:

- (a) from 50% to 99,5% by weight of a cationic fabric softener;
- (b) from 0.5% to 50% by weight of a clay having an ion-exchange capacity from 2 to 35 meq/100 gram and a specific surface area from 2 to 100 m²/gram.

2. The composition in accordance with Claim 1 wherein the weight ratio of cationic fabric softener to clay is in the range from 1:1 to 80:1, and the clay has a specific surface area from 4 to 25 m²/g.

3. A liquid fabric treatment composition comprising:

- (a) from 2% to 25% by weight of a cationic fabric softener;
- (b) from 0.1 to 10% by weight of a clay having an ion-exchange capacity from 2 to 35 meq/100 gram, and a specific surface area from 2 to 100 m²/gram;
- (c) from 40% to 98% by weight of liquid carrier and additives;

and wherein the weight ratio of the cationic fabric softener to the clay is in the range from 1:1 to 80:1.

4. The composition in accordance with Claim 3 wherein the cationic fabric softener is present in an amount from 4% to 8% by weight, the clay in an amount from 0.1% to 0.5% by weight, and wherein the weight ratio of cationic softener to clay is in the range from 2:1 to 25:1.

5. The composition in accordance with Claim 3 wherein the cationic fabric softener is present in an amount from 12% to 18% by weight, the clay in an amount from 0.5% to 3.5% by weight, and wherein the weight ratio of cationic softener to clay is in the range from 2:1 to 25:1.



6. The composition in accordance with Claim 3 wherein the clay has a specific surface area from 4 to 25 m²/g.

7. The composition in accordance with Claims 3-6 wherein (c) represents from 65% to 98% by weight.

8. The composition in accordance with Claim 3, wherein the clay is kaolin, muscovite, mica, talc and mixtures thereof.

9. The composition in accordance with Claims 1 and 3, wherein said clay has been mixed before being added with an optional component in a weight ratio of clay:optional component of from 1:5 to 6:1.

10. The composition in accordance with Claim 9 wherein the optional component is glycerol, ethylene glycol, triethanolamine, polyethylene glycol, polyethyleneimine, or a mixture thereof.

11. The composition in accordance with Claims 9 and 10 wherein the weight ratio of clay:optional component is from 1:2 to 1:1.

12. A solid fabric treatment composition comprising:

- (a) from 10% to 99% by weight of a binary active mixture consisting of, calculated by reference to the sum of the two ingredients,
 - (i) from 90% to 50% by weight of a cationic fabric softener, and
 - (ii) from 10% to 50% by weight of a clay having an ion-exchange capacity from 2 to 35 meq/100 g. and a specific surface area from 2 to 100m²/g.;
- (b) from 1% to 90% of additives and processing aids whereby said additives and aids are:

-sodium sulfate	0-70%
-tripolyphosphate	0-20%
-polyethylene glycol	0-10%
-copolymer of maleic anhydride and (meth)acrylic acid	0-10%
-brightener	0-5%
-aesthetics	0-5%
-photoactivator	0-1000 ppm
-germicide	0-2%
-sodium perborate	0-40%
-citric acid	0-20%
-enzyme	0-2%
-anionic surfactant	0-20%
-nonionic and/or non-polar surfactant	0-20%
-organophosphonate sequestrant	0-3%.

13. The composition in accordance with Claim 12 wherein the clay has a specific surface area from 4 to 25 m²/g.



European Patent
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EUROPEAN SEARCH REPORT

0150531
Application number

EP 84 20 1839

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	EP-A-0 023 367 (PROCTER & GAMBLE LTD.) * Claims 1,7 *	1	C 11 D 3/00 C 11 D 3/12
Y	EP-A-0 004 111 (PROCTER & GAMBLE CO.) * Claims 1,4 *	1	
Y	GB-A-2 104 540 (COLGATE-PALMOLIVE CO.) * Page 2, example 2 *	1	
Y	GB-A-2 020 689 (COLGATE-PALMOLIVE CO.) * Claims 1-7,11,12 *	1	
D,Y	US-A-4 292 035 (C.H. BATTRELL) * Abstract, claims 1,2,7 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
D,A	GB-A-1 400 898 (PROCTER & GAMBLE CO.) * Claims 1,10,11 *		C 11 D 3/00
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 13-03-1985	Examiner SCHULTZE D
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	