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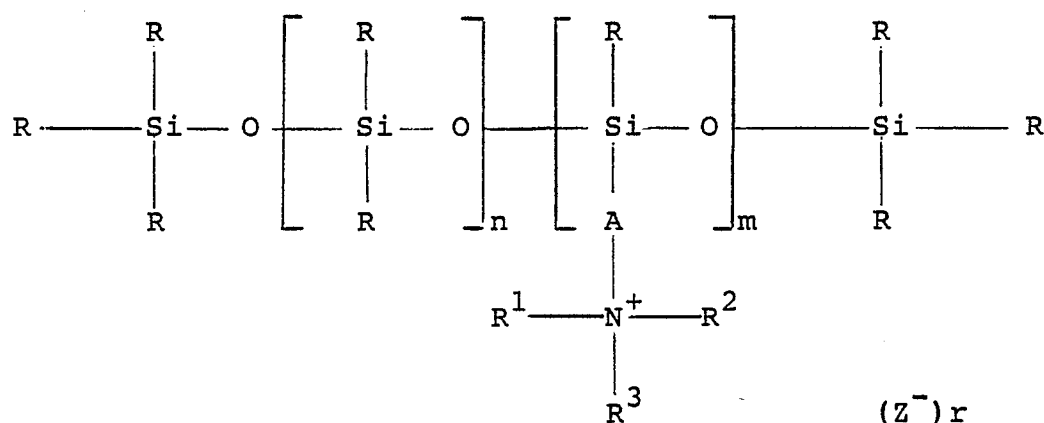
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Method of conditioning fabrics.

A method of conditioning fabrics comprises contacting the fabrics in an aqueous environment with a fabric conditioning agent. The fabric conditioning agent comprises an organofunctional polyalkyl siloxane having the general formula (I)



(I)

wherein each R is independently an alkyl group containing 1 to 4 carbon atoms, each of R¹, R², and R³ is independently an alkyl group containing 1 to 24 carbon atoms or R³ is the group (CH₂)_q COO⁻ where q is 0 to 10, A is a divalent hydrocarbon group interrupted by or substituted with one or more oxygen containing groups, Z is a monovalent anion or the equivalent thereof, n and m are positive integers and r is

a positive integer or zero such as to render the siloxane electrically neutral.

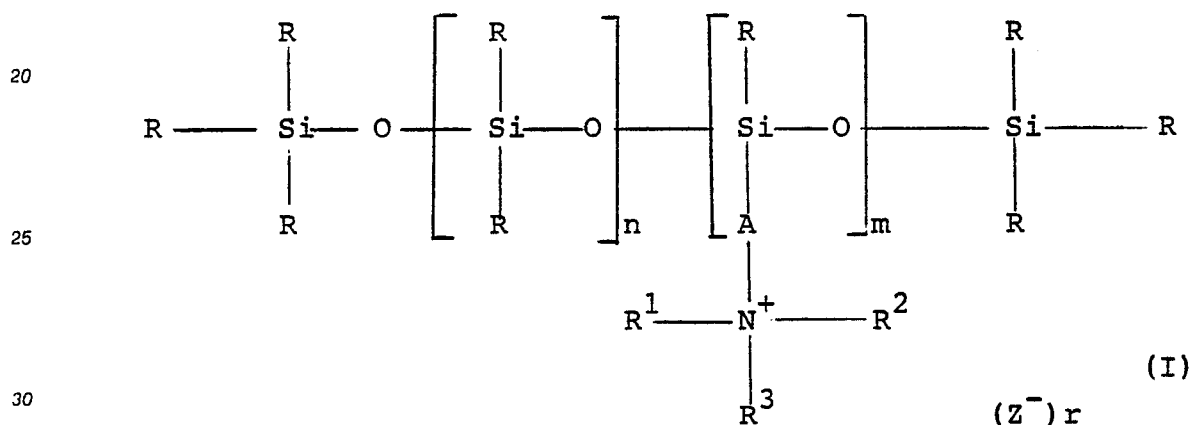
Method of conditioning fabrics and compositions therefor

This invention relates to a method of conditioning fabrics and to compositions suitable for use in such methods.

It is known to condition fabrics, particularly during or immediately following a fabric washing process, to improve the properties of the treated fabrics. Usually this treatment includes the treatment with a fabric softening agent intended to soften and reduce the harshness of washed fabrics. The fabric softening agent may be included in a fabric washing composition, in a composition intended to be added to the rinse subsequent to washing the fabrics or included in a composition intended to be added with wet fabrics to a hot air dryer. In all cases the conditioning process takes place in an aqueous environment.

A number of fabric conditioning materials are known, including soap, smectite clays, quaternary ammonium salts and fatty amines. All these materials have been commercially used but suffer from a variety of disadvantages. For example quaternary ammonium salts, which have been most widely used, are difficult to incorporate in liquid products except at relatively low concentrations, are not easily dispersed in cold water and may, if used in excess, render the treated fabrics water repellent.

We have now discovered a class of fabric conditioning agents having particularly advantageous properties, and the invention is therefore characterised in that the fabric conditioning agent is an organofunctional polyalkyl siloxane having the general formula (I)



wherein each R is independently an alkyl group containing 1 to 4 carbon atoms, each of R¹, R², and R³, is independently an alkyl group containing 1 to 24 carbon atoms or R³ is the group (CH₂)_q COO⁻ where q is 0 to 10, A is a divalent hydrocarbon group interrupted by or substituted with one or more oxygen containing groups, Z is a monovalent anion or the equivalent thereof, n and m are positive integers and r is a positive integer or zero such as to render the siloxane electrically neutral.

We are aware of British Patent No. 1 549 180 (Procter and Gamble) which discloses the combination of a cationic softener and a selected siloxane of general formula (I), except that A is a divalent hydrocarbon.

German Patent Application 3 542 725 (Hoffman's) describes fabric treatment compositions containing a polyalkyl siloxane with a quaternary nitrogen group, a cationic fatty acid condensation product and a cationic film former. Such compositions are hereby declared to be outside the scope of the present invention.

Organosilicone compounds within the general formula (I), are commercially available, ex Th. Goldschmidt AG, Essen, Germany. Thus in the commercially available material ABIL (registered Trade Mark) B9905, R, R¹ and R² are methyl groups, R³ is an isopropyl group, A is the group -OCH₂CH(OH)CH₂- and X is methosulphate. ABIL B9950 from the same supplier, is similar with the group R³ being -CH₂-COO⁻ and r being correspondingly zero. These materials are marketed as hair conditioning agents.

A composition for use in the method according to the invention containing the siloxane material of general formula (I) may take a variety of forms. It may for example be a liquid or solid fabric washing product which, in addition to the fabric conditioning agent, may comprise surfactants selected from anionic, nonionic and cationic surfactant materials, mixtures thereof or with other surfactant materials, detergency builder materials such as water-soluble precipitating or sequestering builder materials or ion-exchange builder materials, bleaches such as peroxybleaches, optionally together with bleach activators, alkaline

materials such as sodium silicate, fillers such as sodium sulphate and also the other conventional ingredients of such compositions.

Alternatively the composition for use according to the invention may be in the form of a rinse conditioning composition, for example a liquid rinse conditioning composition which in addition to the fabric conditioning agent may comprise electrolytes, emulsifiers, viscosity modifying agents, thickeners, colourants and also the other conventional ingredients of such compositions.

Still further, the composition for use in the method according to the invention may be in the form of a product for use in a hot air rotary dryer, for example in the form of a powder contained within a dispensing device or in the form of a coating on, or impregnation of, a flexible substrate material, which may be in sheet form.

Also the composition for use according to the invention may be in a form suitable for direct application to fabric, such as in the form of an aerosol spray containing at least the fabric conditioning agent and a suitable propellant.

Any of the above products may contain, in addition to the siloxane conditioning agent, other fabric conditioning agents such as other fabric softeners (especially water-insoluble cationic and nonionic softeners), anti-static agents (especially water-soluble cationic materials), perfumes, drape imparting agents, crease resistance imparting agents and ironing aids.

Suitable water-insoluble cationic and nonionic softeners are disclosed in European Patent Application 122 141 (Unilever) and European Patent Application 59 502 (Procter and Gamble) incorporated herein by reference.

When the compositions for use according to the invention, are in the form of rinse conditioning compositions, the total level of the polyalkylsiloxane and nonionic fabric softener, if present, lies between 3 to 30% by weight of the composition. In use such compositions are added to water to form a liquor with which the fabrics to be treated are contacted. Generally, the total concentration of the polyalkyl siloxane and nonionic fabric softener in the liquor will be between about 20 ppm and 500 ppm.

The invention will now be further described in the following non-limiting examples.

EXAMPLES 1-10

In these examples the following materials are referred to:

S929 : a commercially available material Silicone 929 (ex Dow Corning) containing amine side groups;

PWK : a commercially available cationic fabric softener Prepagen WK, which is approximately dihardened tallow dimethyl ammonium chloride;

S1 : a polysiloxane of general formula (I) in which R, R¹ and R² are methyl, R³ is isopropyl, A is the group $-(CH_2)_3 OCH_2 CH(OH)CH_2$, n is 53, m is 5 and Z is acetate;

S1A : identical to S1 except n is 83;

S1B : identical to S1 except n is 38;

Brij 72 : a C₁₈ alcohol ethoxylated with 2EO groups;

GMS : glycerol monostearate;

Tween 60 : a polyoxyethylene sorbitan monostearate containing 20 ethylene oxide groups per molecule.

In the following experiments, the softening performance of these materials was tested and compared with a water only treatment.

In a laboratory scale apparatus, one 50g piece of 67/33 polyester cotton measuring about 15cm × 15cm was rinsed in 1 litre of a rinse liquor containing 0.1%, 0.2% or 0.4% of the tested material based on the weight of the fabric. After treatment the tested cloths were line dried and the terry towelling pieces were assessed for softness against standards. A softness ranking was given to each test cloth. The results obtained were as follows, lower softness numbers indicating better softness.

	<u>Example No</u>	<u>Tested material</u>	<u>% on fabric</u>	<u>softness ranking</u>
5	1	nil (water)	-	9
	2	S 929	0.1%	6
	3	S 929	0.2%	4
10	4	S 929	0.4%	3
	5	PWK	0.1%	6.5
	6	PWK	0.2%	4
	7	PWK	0.4%	4
15	8	S1	0.1%	6.5
	9	S1	0.2%	4
	10	S1	0.4%	4

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Examples 1 to 7 are comparative. Examples 8 to 10 are according to the invention.

The rewetability of the treated polyester cotton test cloths was then assessed using a modified Draves test (C.Z. Draves, Am. Dyestuff Reporter 28, 421-1939) in which the time in seconds is measured for a small piece of treated fabric placed on the surface of water to sink. The results were as follows:

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	<u>Example No</u>	<u>Rewetability (seconds)</u>
30	3	360
	4	more than 600
	6	2
	7	3
35	9	1
	10	1

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These results demonstrate that the softening materials according to the invention provide fabric softening effects which are comparable with known softening materials, but also provide improved rewetability effects, especially in comparison with other silicone materials.

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EXAMPLES 11-13

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In these examples, compositions containing a nonionic fabric softener and a polysiloxane were prepared according to the formulations given below. The compositions were prepared by melting the active ingredients at 70°C. The molten mixture thus formed was dispersed into hot water at 70°C and cooled to room temperature.

The softness and rewetability of the treated polyester cotton cloths were tested as described above. The results obtained are as follows -

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<u>Example</u>	<u>Tested composition</u>	<u>% on fabric</u>	<u>Softness ranking</u>	<u>Rewetability (seconds)</u>
11	3% Brij 72 12% S1A	0.2	4.3	3.6
12	3% GMS 6% S1A 6% Petroleum jelly 3% Tween 60	0.2	6.1	2.9
13	8-10% of conventional cationic softener	0.2	-	> 120

If the S1A in Example 12 is replaced by S1B similar results may be obtained.

A non-treated fabric had a softness ranking of 8.

Examples 11, 12, with 6% S1B, rather than 6% S1A, and 13 were subjected to the following freeze/thaw test.

The test composition was stored in a screw-capped polyethylene bottle for 16 hours at a temperature of about -10°C. The composition was then allowed to thaw at ambient temperature for 8 hours.

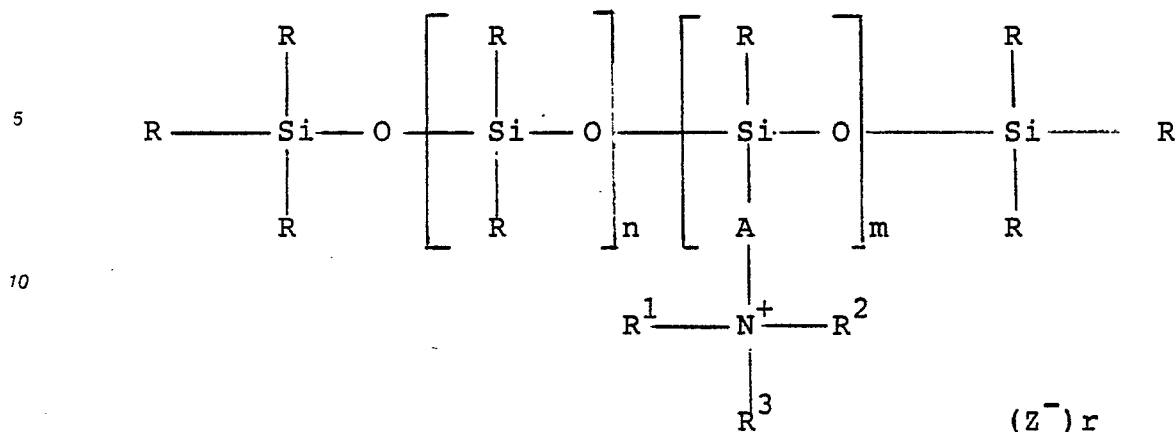
The state of each composition was assessed visually after 1 freeze/thaw cycle.

<u>Example</u>	<u>State of Composition</u>
11	Product was thicker than normal but was pourable
12	No visual difference between products before and after one freeze/thaw cycle
13	Product had gelled

These results show that the combination of the conditioning materials according to the invention with a nonionic fabric softener provide improved rewetability effects and are more freeze/thaw stable than compositions containing conventional cationic materials.

Claims

1. A method of conditioning fabrics which comprises the step of contacting fabrics in an aqueous environment with a fabric conditioning agent, characterised in that the fabric conditioning agent is an organofunctional polyalkyl siloxane having the general formula (I)



(I)

wherein each R is independently an alkyl group containing 1 to 4 carbon atoms, each of R¹, R², and R³ is independently an alkyl group containing 1 to 24 carbon atoms or R³ is the group (CH₂)_q COO⁻ where q is 0 to 10, A is a divalent hydrocarbon group interrupted by or substituted with one or more oxygen containing groups, Z is a monovalent anion or the equivalent thereof, n and m are positive integers and r is a positive integer or zero such as to render the siloxane electrically neutral.

2. A method according to Claim 1 characterised in that the fabric conditioning agent further comprises a nonionic fabric softener.

3. A method according to Claims 1 or 2 characterised in that the organofunctional polyalkyl siloxane is selected from organofunctional polyalkyl siloxanes of formula (I) in which

- (i) m is 5, n is 53;
- (ii) m is 5, n is 83; and
- (iii) m is 5, n is 38.

4. A method according to any of Claims 1 to 3 characterised in that the organofunctional polysiloxane is such that R, R¹ and R² are each methyl, R³ is isopropyl, A is -(CH₂)₃OCH₂CH(OH)CH₂- and Z is acetate.