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(71) Applicant (for all designated States except MN):

RECKITT BENCKISER CALGON BV [NL/NL]; Siri-
usdreef 14, 2132 WT Hoofddorp (NL).

(71) Applicant (for MN only): **RECKITT BENCKISER**

(BRANDS) LIMITED [GB/GB]; 103-105 Bath Road,
Slough Berkshire SL1 3UH (GB).

(72) Inventors: **DE LAZZARI, Paolo**; Reckitt Benckiser Italia,

Piazza San Nicolò, 12/3, VE 30034 Mira (IT). **FAVARO, Irene**; Reckitt Benckiser Italia, Piazza San Nicolò, 12/3,
VE 30034 Mira (IT). **PAVAN, Massimo**; Reckitt Benck-
iser Italia, Piazza San Nicolò, 12/3, VE 30034 Mira (IT).

(74) Agents: **BOWERS, Craig** et al.; Dansom Lane, Hull

Humberside HU8 7DS (GB).

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(54) Title: WATER SOFTENING COMPOSITION

(57) **Abstract:** A self-adhesive water softening composition comprises: up to 95%wt. of an polycarboxylate polymer; up to 5wt% of a polyhydric alcohol; and further optionally one or more further optional constituents which may impart a further aesthetic or technical benefit to the said self-adhesive water softening composition; wherein in use, the said self-adhesive water softening composition may be applied and adhered to a dry or wetted surface, especially an interior sidewall in an automatic laundry washing machine, and wherein the said self-adhesive water softening compositions is retained adhered to the said surface following a plurality of operations of the automatic laundry washing machine.



WATER SOFTENING COMPOSITION

The object of the present invention is a gradual release composition and dosing device of water softening substances in automatic laundry washing machine.

It is well known that certain metal compounds, notably calcium compounds, when present in water, have a significant effect on the properties of the water. For example, "hard" water containing a significant loading of soluble calcium and magnesium compounds may require a large amount of soap or detergent in order to form a lather. Scale deposits can readily form from such water, for example on heating or pH change or evaporation. These can be incrustations, which are left on a surface that has come into contact with the hard water. Particular issues arise in ware washing machines, such as dish and clothes washing machines. In particular scale incrustations may be left on the surfaces of the machines as well as the items washed therein. In particular issues arise with incrustation of heating elements, which reduces their life span and efficiency. A further issue arises in that scale incrustation can be found on the surface of clothes washed in the clothes washing machines which are perceptible to the wearer as feeling harsh to the touch.

As known, before starting each washing cycle the use pours into the suitable trays, into the dedicated compartment, or into the containers to be introduced directly into the basket, the detergent and other additives, such as for example fabric softener, bleach, antibacterial or antiscaling agents.

The market offers an increasingly larger number of products which are soluble or may be suspended in wash water, to be added to the ordinary detergent before the traditional washing cycle, suited to improve wash efficiency or to safeguard the condition of the household electric appliance. In order to obtain the desired results, however, the user must remember to add the above said substances at each washing cycle, but sometimes, especially with some products, this does not occur due to the user's laziness or distraction.

The antiscaling agent, in particular, is a product which the user often forgets to introduce, since it performs a preventative action and hence does not give the user an immediate and practical confirmation, as may instead occur with the softener which makes washed items softer, or bleach which makes the laundry brighter, or dishwasher fragrance diffusers which remove unpleasant odours, or rinse aid which improves dishes polish. These substances cause effects which the user immediately detects with his/her senses and they encourage him/her to make constant use thereof.

Moreover, not all household electrical appliances intended for washing have a dedicated compartment for antiscaling introduction, since the problem of the scale deposit on the mechanical components of household electric appliances depends on the user's geographical area, and not all water types have such a hardness index to require a methodical use of an antiscaling product. Similar omissions by the user also regard other products such as for example antibacterial products or the products capable of preserving and cleaning mechanical components of the household electrical appliance such as gaskets, holes for water introduction or pipes carrying the detergent into the wash basket.

It is an object of the invention to address these issues.

According to a first aspect of the invention there is provided a self-adhesive water softening composition which comprises:

up to 95%wt. of an polycarboxylate polymer;

up to 10wt% of a polyhydric alcohol; and

further optionally one or more further optional constituents which may impart a further aesthetic or technical benefit to the said self-adhesive water softening composition;

wherein in use, the said self-adhesive water softening composition may be applied and adhered to a dry or wetted surface, especially an interior sidewall in an automatic laundry washing machine, and wherein the said self-adhesive water softening compositions is retained adhered to the said surface following a plurality of operations of the automatic laundry washing machine.

The composition has been found to be sufficiently adhesive such that it can be retained in its placed locus. Preferably in use / for use the composition is located in the detergent dispensing drawer of automatic laundry washing machine.

The composition of the invention has been found to have particularly beneficial performance in providing water softening in an automatic laundry washing machine.

One benefit is connected with a feature of the invention in that the composition is intended to provide a water softening benefit over a plurality of wash cycles. By doing this a user can perform a number of wash cycles without the inconvenience of having to add a water composition to the automatic laundry washing machine. Preferably this benefit is provided over around 10 wash cycles. By wash cycle in this context it is meant a complete washing program such as can be found on an automatic laundry washing machine; such as those cycles labeled "wool", "cotton", "synthetics". It is of course realized that this list is not exhaustive and that the list varies from country to country and from manufacturer to manufacturer. Of course it is also realized that sometimes a user of an automatic laundry washing machine sometimes runs the machine such that only a portion of a cycle is completed. Again here the composition of the invention can still provide a benefit.

It has been found that the composition has been found to release a uniform amount of water softening composition in each wash cycle. This is beneficial in that a user obtains the correct amount of water softening level over a plurality of wash cycles without having to replace the composition.

The composition has been found to provide its own clear visual signal (by the size of its presence) to a user for when it needs replacing.

The composition has been found to be sufficiently adhesive such that it can be retained in its placed locus. Preferably the composition is adhesive when wetted. This can be achieved by wetting the surface to which the composition is to be applied or by wetting the composition itself. The wetting is preferably by the application of water and / or an aqueous composition.

Generally the polycarboxylate polymer comprises an admixture of different polycarboxylate polymers.

Either or both polymeric agents may be fully, partially or non-neutralised.

Preferably the composition comprises a copolymer of an olefin and an unsaturatated carboxylic acid. Preferably the composition comprises a copolymer of an olefin and an unsaturatated carboxylic acid. Preferably the unsaturatated carboxylic acid comprises maleic acid. Generally the copolymer of an olefin and an unsaturatated carboxylic acid has a molecular weight of around 10000.

Preferably the copolymer of an olefin and an unsaturatated carboxylic acid is present in the composition at a level of around 2wt%, more preferably from 0.1 to 2wt%; most preferably from 0-2wt%.

Preferably the composition comprises a polymer of acrylic acid. Generally the polymer of acrylic acid has a molecular weight of around 4000 to 8000.

Preferably the polymer of acrylic acid is present in the composition at a level of from 40wt% to 90wt%.

Generally the polyhydric alcohol comprises sorbitol and / or glycerol.

Preferably the polyhydric alcohol is present in the composition at a level of from 0.1 to 10wt%; most preferably about 5wt%.

Preferably the composition is substantially free from any fabric softening actives, surfactant, and/or bleach. By substantially free we mean <15 percent wt, <12 percent wt, <10 percent wt, <8 percent wt, <6 percent wt, <4 percent wt, <2 percent wt, <1 percent wt, <0.5 percent wt, <0.1 percent wt, <0.01 percent wt of each and any combination or all of the ingredients listed above.

The composition may contain one or more detergent adjuncts such as dye transfer inhibitor, enzyme, optical brightener, soil suspending agent, fragrance, dye.

A preferred non-limiting example of a composition according to the invention is shown below.

Raw Material	Odyssy P2015-064	Odyssy P2015-065
Maleate-olefin Copolymer powder (91%)	0,26	0,26
Homopolymer Polyacrylate WE 92%	58,30	68,38
Liquid Polyacrylate N (45% sol)	34,46	24,46
Glycerol 99%	4,96	4,92
Liquitint Blue HP (Dye)	0,020	0,020
Fragrance	2,00	1,97
	100,00	100,01

According to a second aspect of the invention there is provided a dispensing device which comprises a quantity of a self-adhesive water softening composition according to the first aspect of the invention, which dispensing device is adapted to release a quantity of the water softening composition into a cycle of an automatic laundry washing machine.

It will be appreciated that the features of the first aspect of the invention shall be taken to apply to the second aspect of the invention *mutatis mutandis*.

Preferably in use / for use the device is located in the detergent dispensing drawer of automatic laundry washing machine.

Preferably the dispensing device comprises a cage. Clearly such a cage permits water to enter the device and water loaded with water softening composition to leave the device. Preferably the cage is designed such the ratio of apertures to cage material is high. Preferably the ratio of apertures to cage material is such that the cage material comprises less than 30% of the surface area of the device, more preferably less than 20% and most preferably less than 15%.

Where a cage is used it is possible that the water softening composition is not adhesive. Thus according to an alternate second aspect of the invention there is provided a dispensing device which comprises a quantity of a water softening composition which comprises:
up to 95%wt. of an polycarboxylate polymer;
up to 10wt% of a polyhydric alcohol; and
further optionally one or more further optional constituents which may impart a further aesthetic or technical benefit to the said water softening composition,
which dispensing device is adapted to release a quantity of the water softening composition into a cycle of an automatic laundry washing machine.

According to a third aspect of the invention there is provided a method for treating a cycle of an automatic laundry washing machine comprising the steps of:
applying a self-adhesive water softening composition according to the first aspect of the invention or a device according to the second aspect of the invention to a part of a laundry washing machine wherein the composition / device is in the path of flowing water, which impinges upon the water softening composition and slowly erodes the same, and,
operating the laundry washing machine to dispense a flow of water which impinges on the water softening composition is in the path of flowing water thereby forming a laundry washing machine treatment liquid which treats the laundry washing machine.

The third aspect of the invention shall also be taken to apply to the alternate second aspect of the invention.

It will be appreciated that the features of the first and / or second aspect of the invention shall be taken to apply to the third aspect of the invention *mutatis mutandis*.

CLAIMS

1. A self-adhesive water softening composition which comprises:
up to 95%wt. of an polycarboxylate polymer;
up to 5wt% of a polyhydric alcohol; and
further optionally one or more further optional constituents which may impart a further aesthetic or technical benefit to the said self-adhesive water softening composition;
wherein in use, the said self-adhesive water softening composition may be applied and adhered to a dry or wetted surface, especially an interior sidewall in an automatic laundry washing machine, and wherein the said self-adhesive water softening compositions is retained adhered to the said surface following a plurality of operations of the automatic laundry washing machine.
2. A composition according to claim 1 wherein the polycarboxylate polymer comprises an admixture of different polycarboxylate polymers.
3. A composition according to claim 2 wherein the composition comprises a copolymer of an olefin and an unsaturatated carboxylic acid.
4. A composition according to claim 3 wherein the composition comprises a copolymer of an olefin and an unsaturatated carboxylic acid.
5. A composition according to claim 3 or 4 wherein the unsaturatated carboxylic acid comprises maleic acid.
6. A composition according to any one of claims 2 to 5 wherein the composition comprises a polymer of acrylic acid.
7. A composition according to any one of claims 1 to 6 wherein the polyhydric alcohol comprises sorbitol and / or glycerol.
8. A dispensing device which comprises a quantity of a self-adhesive water softening composition according to any one of claims 1 to 7, which dispensing device is adapted to release a quantity of the water softening composition into a cycle of an automatic laundry washing machine.
9. A dispensing device, according to claim 8, which comprises a cage.
10. A method for treating a cycle of an automatic laundry washing machine comprising the steps of:
applying a self-adhesive water softening composition according to claim 1 to 7 or a device according to claim 8 or 9 to a part of a laundry washing machine wherein the composition / device is in the path of flowing water, which impinges upon the water softening composition and slowly erodes the same, and,
operating the laundry washing machine to dispense a flow of water which impinges on the water softening composition is in the path of flowing water thereby forming a laundry washing machine treatment liquid which treats the laundry washing machine.

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. C02F1/68 C02F5/10 C11D7/26 C11D3/37 C11D17/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C02F C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/105744 A1 (AMICONI FABIO [IT]) 10 May 2007 (2007-05-10) paragraph [0001] - paragraph [0021] paragraph [0025] - paragraph [0042] claims 1-24 -----	1-10
X	EP 0 812 808 A1 (CLEANTABS AS [DK]) 17 December 1997 (1997-12-17) paragraph [0001] - paragraph [0012] paragraph [0015] - paragraph [0029] paragraph [0049] - paragraph [0059] claims 1-11; table 1 -----	1-10
X	DE 41 22 490 A1 (HENKEL KGAA [DE]) 7 January 1993 (1993-01-07) column 1, line 1 - line 10 column 2, line 10 - column 4, line 13 claims 1-8; example 2 ----- -/-	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

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Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Zsigmond, Zoltán

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2013/178990 A2 (RECKITT BENCKISER NV [NL]; RECKITT & COLMAN OVERSEAS [GB]) 5 December 2013 (2013-12-05) the whole document -----	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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