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(54) **Ingredient dispenser for automatic dishwashers**

Reinigerspender für automatische Geschirrpsülmaschine

Distributeur de détergent pour lave-vaisselles automatiques

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Description

[0001] This invention relates to a dispenser for use inside an automatic dishwasher to provide controlled release of dishwashing active ingredients into the dishwasher over multiple dishwashing cycles.

[0002] It is known to provide devices inside an automatic dishwasher for the supply of ingredients. EP 154421 describes a solid product formed from polyethylene glycol and nonionic surfactants which provides controlled release in the wash and rinse cycles for improved cleaning and reduced spotting and streaking. The product is placed inside a cylindrical dispenser having a top opening of 20 sq.cm in area and four side openings whose sizes can be adjustable according to water temperature and which range from 0.6 to 2.5 sq.cm in area. W096/38638 describes a dispenser for dispensing fragrance in the form of a waxy cake into a dishwasher during operation. The dispenser has a main body portion forming a cavity into which the waxy cake is secured by means of retaining pins, and a hinged lockable front plate having elongated openings through which water can pass to dissolve and release fragrance. The openings are large enough to provide a visual indication of the amount of fragrance cake remaining in the dispenser.

[0003] A problem with dispensers such as those described above is their high unit cost and complexity to manufacture on a large scale, due to their multi-part construction and the requirement for injection moulding techniques.

[0004] The present invention provides a solution to the problem of obtaining effective controlled release of dishwashing active ingredients into the interior of a dishwasher in a low cost and adaptable manner. A dispenser according to the preamble of the independent claim is known from EP 1 072 715.

[0005] According to a first aspect of the invention, there is provided a dispenser for use inside an automatic dishwasher to provide controlled release of one or more dishwashing active ingredients into the dishwasher over multiple dishwashing cycles, the dispenser comprising a perforated flexible polyolefin sheet which is in fluid communication with a composition having one or more dishwashing active ingredients, in which the perforation density of the polyolefin sheet ranges from 1 to 100 perforations per cm^2 of sheet and in which the perforations individually have an area ranging from 0.0004 to 0.01 mm^2.

[0006] By "multiple dishwashing cycles" is meant at least two dishwashing cycles, and may conveniently be up to about 100 dishwashing cycles. Conveniently the controlled release may occur over a period of 2 to 60, preferably 30 to 60, dishwashing cycles. By "dishwashing cycle" in this instance is meant a complete dishwashing cycle, including any pre wash, a wash at normal temperature (e.g. 50°C), and any rinses.

[0007] According to a second aspect of the invention, there is provided a method of providing controlled release of one or more dishwashing active ingredients into the dishwasher over multiple dishwashing cycles, the method comprising the steps of packaging a composition containing the one or more active ingredients into a dispenser as defined above, adding the dispenser to a dishwasher prior to the commencement of a dishwashing cycle, and leaving it in the dishwasher for multiple dishwashing cycles.

[0008] In a preferred embodiment, the dispenser is in the form of a sachet comprised of two side walls sealed around the peripheral edges and enclosing the composition as defined above, in which at least one (but conveniently both) of the side walls comprises a perforated flexible polyolefin sheet as defined above. Such a sachet is simple and cost-effective to produce. It also enables improved tailoring and adaptability of dosage and ingredients, since the low unit cost means that such sachets can be used in multiples. In this way, the user can boost the dosage of a particular dishwashing active ingredient as and when required, or can provide a regime of different dishwashing active ingredients in individual sachets according to requirements. The packaging of different dishwashing active ingredients into separate individual sachets according to the invention also solves the problem of product stability in those instances where such ingredients may be chemically and/or physically incompatible (for example where oxidative materials such as bleaches are involved together with other oxidation-sensitive materials).

[0009] Suitable flexible polyolefin materials used to form the perforated flexible polyolefin sheet in the dispenser of the invention will retain their integrity at the temperatures involved in dishwashing (e.g. 70 to 75degC) for prolonged periods. Examples include low density polyethylene, polypropylene, and high density polyethylene. The flexible polyolefin sheet can also be a laminate.

[0010] Preferably the perforations of the flexible polyolefin sheet have individual areas ranging from 0.0007 mm^2 to 0.006 mm^2, and a perforation density of from 1 to 10 perforations per cm^2 of sheet. Conveniently, the perforations are circular.

[0011] In a preferred embodiment, the perforated flexible polyolefin sheet of the dispenser may be coated with a water soluble polymer such as polyvinyl alcohol to prevent egress of the contents of the dispenser prior to use.

[0012] In a particularly envisaged embodiment, a device (such as a cage structure) for use in a dishwasher may comprise a number (e.g. 1 to 5, preferably 2 to 5) of dispensers according to the invention retained in the device, with each dispenser containing different dishwashing active ingredients intended for use in the dishwashing cycle. One or more of the dispensers may be interchangeable in the device for a fresh dispenser, thereby enabling the device to be used for more than the lifetime of the individual dispensers. Alternatively, multiple dispensers containing the same dishwashing active ingredient can be used in such a device, so that the user can tailor the number used and hence the dosage pro-

vided into the dishwasher according to the prevailing conditions (such as water hardness or level of soiling).

[0013] Dispensers according to the invention contain one or more dishwashing active ingredients. By "dishwashing active ingredient" is meant an ingredient that enhances the end-results obtained after treatment of articles in the dishwasher. Such enhancement may occur by improved removal of soil, reduction of deposits such as films, spots or streaks left on the articles after they have been treated in the dishwasher, or reduction of negative effects associated with the dishwashing process such as glass corrosion and colour fading.

[0014] Suitable dishwashing active ingredients include rinse-aids, anti-scaling agents, bleaches and bleach activators, builders, chelating agents, degreasing agents, anti-spotting agents and glass anti-corrosion agents (such as those described in WO00/39259 and WO01/64823).

[0015] Particularly preferred dishwashing active ingredients in the context of this invention are nonionic surfactants. These provide a rinse-aid functionality in the dishwasher, and may be used alone or in combination with other dishwashing active ingredients.

[0016] It is important, when the dishwashing active ingredient contains nonionic surfactant, that the nonionic surfactant is selected or prepared to have the desired leaching rate through the perforated flexible polyolefin sheet of the dispenser. This may be achieved by a number of technical routes.

[0017] In one embodiment, the nonionic surfactant is selected so as to be one which forms a thickened liquid crystal phase, such as a meso-phase on the addition of water. A meso-phase is a form of liquid crystal which can be formed by the addition of water to some nonionic surfactants, which liquid crystal form is relatively insoluble. It is this relative insolubility and the consequent leaching properties which make the selected nonionic surfactants particularly suitable for use in the dispenser of the invention.

[0018] Suitable nonionic surfactants which provide such a relatively insoluble meso-phase on the addition of water include ethoxylated surfactants, ethylene oxide/propylene oxide block copolymer surfactants, and blends of these with ethoxylated surfactants.

[0019] Preferred specific examples of nonionic surfactants which provide a relatively insoluble meso-phase on the addition of water include ethoxylates based on C13-15 fully saturated, branched primary alcohol, available as the SYNPERONIC A series, ex Uniqema. In some circumstances it may be desirable to use such materials in conjunction with a foam suppressor to ensure that unduly high levels of foam are not generated.

[0020] In another embodiment, the nonionic surfactant is selected so as to be one which is a solid at room temperature, which dissolves slowly in water, and which typically has a cloud point in the range 12°C to 30°C. Preferably the cloud point may be less than 25°C, more preferably less than 20°C, and in some embodiments may preferably be less than 15°C. A suitable example of a nonionic surfactant having the above properties is POLYTERGENT SLF18B45, ex BASF.

[0021] Alternatively, the nonionic surfactant can be prepared so as to have a suitable leaching rate in the dispenser of the invention. One way is to impregnate the nonionic surfactant onto an insoluble, preferably flexible textile substrate.

The textile substrate may be woven or non-woven. Suitable textile substrates include cotton. However, other suitable substrates are inflexible hard solids, and include porous inorganic insoluble materials such as zeolites, silica, phosphates and carbonates, as well as clays.

[0022] A further method of preparing a nonionic surfactant so as to have a suitable leaching rate includes combining it with a suitable thickener or structurant, to provide a gel.

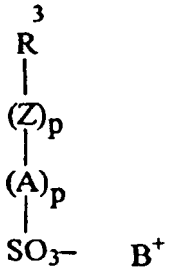
Suitable thickeners or structurants for use according to the invention include cross linked polyacrylate materials such as the CARBOPOL series, ex B F Goodrich.

[0023] Nonionic surfactant may typically be present in the composition for use with the dispenser of the invention at 5% to 100% by weight, more preferably from 50% to 100% by weight based on total weight.

[0024] The nonionic surfactant may also contribute as a rinse aid.

[0025] Another preferred class of dishwashing active ingredient in the context of this invention are anti-scaling agents. These may be present in the composition contained in the dispenser as a suitable dishwashing active ingredient, either alone or in combination with other dishwashing active ingredients such as the nonionic surfactants described above. It is preferable if the level of anti-scaling agent is from 0.2 to 95%, preferably from 0.5 to 50% by total weight of anti-scaling agent based on the total weight of the composition in the dispenser.

[0026] Suitable anti-scaling agents include water soluble polymers which reduce phosphate scale formation. Such a polymer often comprises at least one structural unit derived from a monomer having the formula:



(III)

wherein R^3 is a group comprising at least one sp^2 bond, z is O, N, P, S, or an amido or ester link, A is a mono- or a polycyclic aromatic group or an aliphatic group and each p is independently 0 or 1 and B^+ is a monovalent cation.

[0027] Preferably, R^3 is a C_2 to C_6 alkene (most pref-

erably ethene or propene). When R^3 is ethenyl, Z is preferably amido, A is preferably a divalent butyl group, each p is 1, and B^+ is Na^+. Such a monomer is polymerized and sold as Acumer 3100 by Rohm & Haas.

[0028] Another preferred embodiment exists when the water soluble polymer is derived from at least one monomer with R^3 as 2-methyl-2-propenyl, Z as oxygen, A as phenylene, each p as 1 and B^+ as Na^+, and at least one monomer with R^3 as 2-methyl-2-propenyl, each p as 0 and B^+ as Na^+. Such monomers are polymerized and sold under the name Alcosperse 240 by Alco Chemical.

[0029] The polymers used may be homopolymers or copolymers, including terpolymers. Furthermore, the polymers may be terminated with conventional termination groups resulting from precursor monomers and/or initiators that are used.

[0030] The water soluble polymers typically have a weight average molecular weight from about 1,000 to about 50,000.

[0031] Further suitable polymers for use in this context are those sulfonated polymers which are described in WO02/04503 (Henkel).

[0032] Further suitable anti-scaling agents are compounds that may be used to reduce carbonate scale formation. These include polyacrylates (and copolymers thereof) having a weight average molecular weight from about 1,000 to about 400,000.

Such compounds are supplied by Rohm and Haas, BASF, and Alco Corp. Preferred copolymers include those derived from acrylic acid and maleic acid monomers like Sokalan CP5 and CP7 supplied by BASF, and Acusol 479N, supplied by Rohm & Haas. Copolymers of acrylic acid and methacrylic acid (Colloid 226/35), as supplied by Rhone-Poulenc, may also be used.

[0033] Other materials that may be used to reduce carbonate scale formation include phosphonate functionalized acrylic acid (Casi 773 as supplied by Buckman laboratories); copolymers of maleic acid and vinyl acetate, and terpolymers of maleic acid, acrylic acid and vinyl acetate (made commercially by Huls); polymaleates (like Belclene 200, as supplied by FMC); polymethacrylates, (like Tomal 850, as supplied by Rohm & Haas); polyaspartates; ethylene diamine disuccinate, organopolyphosphonic acids (and salts thereof) such as sodium salts of amino tri(methylenephosphonic acid), diethylene triamine penta (methylene phosphonic acid); hexamethylene diamine tetramethylene phosphonic acid; ethane 1-hydroxy-1,1-diphosphonic acid (HEDP); organomonophosphonic acids (and salts thereof) such as the sodium salt of 2-phosphono-1,2,4-butane tricarboxylic acid, all of which are sold under the DEQUEST line as supplied by Solutia.

[0034] Particularly preferred anti-scaling agents are organic phosphonates such as alpha-hydroxy-2 phenyl ethyl diphosphonate; ethylene diphosphonate; hydroxy 1,1-hexylidene, vinylidene 1,1 diphosphonate; 1,2 dihydroxyethane 1,1 diphosphonate and 1-hydroxy-ethylene 1,1 diphosphonate. Most preferred is 1-hydroxy-ethylene 1,1 diphosphonate (commercially available as DEQUEST 2016 and DEQUEST 2016D, ex Solutia) and 2-phosphono-butane, 1,2,4 tricarboxylic acid (commercially available as BAYHIBIT, ex Bayer).

[0035] Mixtures of anti-scaling agents may be used; particularly useful are a mixture of organic phosphonates and polymers having as monomer units acrylic acid, methyl methacrylic acid, 4-sulfophenyl methylallyl ether or sodium methallyl sulfonate.

[0036] The anti-scaling agent or agents may be combined with other materials such as a suitable thickener or structurant to provide a gel as described above, and/or other dishwashing active ingredients such as nonionic surfactants. The weight ratio of total anti-scaling agent to total nonionic surfactant in such a combination preferably ranges from 1:20 to 3:1, more preferably from 1:10 to 1:2, even more preferably from 1:1 to 1:2.

[0037] Another preferred class of dishwashing active ingredient in the context of this invention are bleaches and bleach activators.

[0038] Suitable bleaches comprise one or more peroxy bleach compounds, for example, inorganic persalts or organic peroxyacids, which may be employed in conjunction with activators to improve bleaching action at low wash temperatures.

[0039] Organic monoperoxy acids include alkyl peroxy acids and aryl peroxyacids such as peroxybenzoic acid and ring-substituted peroxybenzoic acids (e.g. peroxy-alpha-naphthoic acid); aliphatic and substituted aliphatic monoperoxy acids (e.g. peroxylauric acid and peroxystearic acid); and phthaloyl amido peroxy caproic acid (PAP). Organic diperoxy acids include alkyl diperoxy acids and aryldiperoxy acids, such as 1,12-di-peroxy-dodecanedioic acid (DPDA); 1,9-diperoxyazelaic acid, diperoxybrassylic acid, diperoxysebacic acid and diperoxy isophthalic acid; and 2-decyldiperoxybutane-1,4-dioic acid.

[0040] Preferred inorganic persalts are sodium perborate monohydrate and tetrahydrate, and sodium percarbonate, advantageously employed together with an activator. Monopersulphate is a further possibility.

[0041] Chlorine bleaches may also be used. Among suitable reactive chlorine-or bromine-oxidizing materials are heterocyclic N-bromo and N-chloro imides such as trichloroisocyanuric, tribromoisocyanuric, dibromoisocyanuric and dichloroisocyanuric acids, and salts thereof with water-solublising cations such as potassium and sodium. Hydantoin compounds such as 1,3-dichloro-5,5-dimethyl-hydantoin are also quite suitable.

[0042] Particulate, water-soluble anhydrous inorganic salts are likewise suitable for use herein such as lithium, sodium or calcium hypochlorite and hypobromite. Chlorinated trisodium phosphate and chloroisocyanurates are also suitable bleaching materials.

[0043] Suitable bleach activators include (6-nonamidocaproxyl) oxybenzene sulfonate (as described in EP 170,386) N,N,N',N'-tetraacetylethylenediamine, nonanoyloxybenzenesulfonate, cationic nitriles, cholyl(4-sul-

fophenyl)carbonate, and quaternary imine salts (e.g., N-methyl-3,4-dihydrooisoquinolinium p-toluenesulfonate) and salts of sulfophenyl alkyl carbonates such as sodium p-sulfophenyl octyl carbonate.

[0044] Other bleach activators which may be used include transition metal-containing bleach catalysts such as $[Mn^{IV}{}_2(\mu\text{-}0)_3(Me_3TACN)_2](PF_6)_2$ (as described in U.S. Patent Nos. 4,728,455, 5,114,606, 5,153,161, 5,194,416, 5,227,084, 5,244,594, 5,246,612, 5,246,621, 5,256,779, 5,274,147, 5,280,117), $[Fe^{II}(MeN4py)(MeCN)](ClO_4)_2$ (as described in EP 0 909 809) and $[Co^{III}(NH_3)_5(OAc)](OAc)_2$ (as described in U.S. Patent No. 5,559,261, WO 96/23859, WO 96/23860, WO 96/23861).

[0045] Another active ingredient is a builder. Preferred water-softening builders to include in the composition are sodium tripolyphosphate, sodium citrate, sodium carbonate and sodium silicate.

[0046] A chelating agent for metal ions (often referred to as a metal ion sequestrant) may be present in the composition. It can function to stabilise bleach against premature decomposition catalysed by transition metals and/or to inhibit calcium carbonate scale formation.

[0047] Preferred chelating agents include organic phosphonates, amino carboxylates, polyfunctionally-substituted compounds, and mixtures thereof.

[0048] Particularly preferred chelating agents are organic phosphonates such as α-hydroxy-2 phenyl ethyl diphosphonate, ethylene diphosphonate, hydroxy 1,1-hexylidene, vinylidene 1,1 diphosphonate, 1,2 dihydroxyethane 1,1 diphosphonate and hydroxy-ethylene 1,1 diphosphonate. Most preferred is hydroxy-ethylene 1,1 diphosphonate, 2 phosphono-1,2,4 butanetricarboxylic acid or salts thereof.

[0049] Optionally non ionic surfactants are also serving as degreasing and/or anti-spotting agents.

[0050] A perfume may be incorporated as an optional adjunct ingredient in addition to the one or more dishwashing active ingredients in the composition for use in the dispenser of the invention. Given the intended use of the dispenser of the invention, and in particular its residence in the dishwasher over repeated wash cycles, the perfume is preferably relatively substantive to provide the dishwasher with a pleasant aroma after successive washes over a prolonged period. The perfume may be included as a solid (e.g. porous) block, or may otherwise be provided on a substrate such as a plastic or fabric sheet. Examples of such perfume dispensing systems are described in FR2471929 and FR 2492776.

[0051] The invention will now be further described by way of the following non-limiting examples, in which all percentages are by weight based on total weight unless otherwise specified.

EXAMPLES

[0052] Dispensers in the form of peripherally sealed perforated sachets were prepared containing a variety of dishwashing active ingredients and ingredient compositions. The dispensers were tested on a standard 55°C wash programme in a Miele G6905C automatic dishwasher.

[0053] The dispensers were placed on a flat cutlery rack in the dishwasher. After each wash the weight increase or decrease of the sachet was measured. No dishwashing active ingredients were transferred through the sachet walls themselves; all transfer was through the perforations in the sachets.

[0054] Two types of film were used for making the sachets; the first was NORPOR™ type 13 (ex NORDENIA International AG), polyethylene with circular perforations of 0.08mm diameter and a thickness of 0.15mm (hereinafter designated as "type M polyethylene") and the second was NORPOR™ type 7 (ex NORDENIA International AG), polyethylene with circular perforations of 0.03mm diameter and a thickness of 0.18mm (hereinafter designated as "type L polyethylene"). Both films had a perforation density of 31250 perforations/m^2.

[0055] Dishwashing active ingredients and ingredient compositions used were:

1) PLURAFAC LF403, (ex BASF)
2) POLYTERGENT SLF18B45, (ex BASF)
3) SYNPERONIC A3 (ex Uniqema)
4) SYNPERONIC A7 (ex Uniqema)
5) A blend containing 50% sodium tripolyphosphate, 47.5% PEG6000 and 2.5% DEQUEST 2016, (ex Solutia)
6) DEQUEST 2016D, (ex Solutia)
7) SOKALAN PA25, (ex BASF)

Example 1

[0056] 35-40g POLYTERGENT SLF18B45 nonionic surfactant was packaged in a perforated sachet made of type L polyethylene having a total surface area of 100-120cm^2. The release of the nonionic surfactant from the sachet was steady over multiple dishwashing cycles.

Example 2

[0057] 6-12g SYNPERONIC A3 nonionic surfactant was packaged in a perforated sachet made of type L polyethylene having a total surface area of 25-50cm^2. The release of the nonionic surfactant from the sachet over successive washes was steady over multiple washes, and approximately half of the contents was dispensed after 25 dishwashing cycles.

Example 3

[0058] In Example 3, a dishwashing active ingredient composition was prepared by making a 5% CARBOPOL (cross-linked polyacrylate, ex BF Goodrich) solution in water and combining this with PLURAFAC LF 403 nonionic surfactant in the ratio 1:1 to provide a gel. 16g of gel was packaged in sachets made from both type L and

type M film, each having a surface area of approximately 40cm^2. The resulting sachets provided satisfactory dispensing of the nonionic surfactant over successive dishwashing cycles.

Example 4

[0059] Several KLEENEX (trade mark) wipes of dimensions 21cm x 20cm with a collective weight of 5g were impregnated with 20g of molten POLYTERGENT SLF18B45 nonionic surfactant. The wipes were folded and placed in sachets made from both L and M type polyethylene, the sachets having a surface area of approximately 80cm^2. The resulting sachets provided satisfactory dispensing of the nonionic surfactant over successive dishwashing cycles.

Example 5

[0060] 25g tablets of a blend containing 50% sodium tripolyphosphate, 47.5% PEG6000 and 2.5% DEQUEST 2016, ex Solutia were pressed and packaged in sachets made from both L and M type films. The resulting sachets provided satisfactory dispensing of the dishwashing active ingredients over successive dishwashing cycles.

Example 6

[0061] 10g of DEQUEST 2016D anti-scaling agent, ex Solutia was packaged into sachets made from both L and M type polyethylene having a surface area of approximately 40cm^2. The resulting sachets provided satisfactory dispensing of the anti-scaling agent over successive dishwashing cycles.

Example 7

[0062] A gelled anti-scaling agent composition was prepared containing 3% CARBOPOL polymer, 30% DEQUEST 2016D and the balance water. 25g of the gel was packaged into sachets made from both the L type and the M type polyethylene having a surface area of 70 to 80cm^2. The resulting sachets provided satisfactory dispensing of the anti-scaling agent over successive dishwashing cycles.

Example 8

[0063] 12g of SOKALAN PA25 anti-scaling agent was packaged in sachets made from both L and M type polyethylene, the sachets having a surface area of 30cm^2. The resulting sachets provided satisfactory dispensing of the anti-scaling agent over successive dishwashing cycles.

Claims

1. A dispenser for use inside an automatic dishwasher to provide controlled release of one or more dishwashing active ingredients into the dishwasher over multiple dishwashing cycles, the dispenser comprising a perforated flexible polyolefin sheet which is in fluid communication with a composition having one or more dishwashing active ingredients, **characterised in that** the perforation density of the polyolefin sheet ranges from 1 to 100 perforations/cm^2 and **in that** the perforations individually have an area ranging from 0.0004 to 0.01 mm^2.

2. A dispenser according to claim 1 or claim 2, in which the perforations of the flexible polyolefin sheet have individual areas ranging from 0.0007 mm^2 to 0.006 mm^2, and a perforation density of from 1 to 10 perforations per cm^2 of sheet.

3. A dispenser according to any of the preceding claims, wherein the perforated flexible polyolefin sheet is initially coated with a water-soluble polymer.

4. A device for locating in an automatic dishwasher which comprises a number of dispensers according to any of the preceding claims retained in the device.

5. A method of providing controlled release of one or more dishwashing active ingredients into the dishwasher over multiple dishwashing cycles, the method comprising the steps of packaging a composition containing the one or more active ingredients into a dispenser according to any one of claims 1 to 5, adding the dispenser to a dishwasher prior to the commencement of a dishwashing cycle, and leaving it in the dishwasher for multiple dishwashing cycles.

Patentansprüche

1. Spender zur Verwendung im Inneren einer automatischen Geschirrspülmaschine, um eine kontrollierte Freisetzung eines oder mehrerer aktiver Geschirrspül-Ingredienzien in die Geschirrspülmaschine über mehrere Geschirrspülzyklen freizusetzen, wobei der Spender eine perforierte flexible Polyolefinfolie umfasst, die in Flüssigkeits-Kommunikation mit einer Zusammensetzung ist, die ein oder mehrere aktive Geschirrspül-Ingredienzien hat, **dadurch gekennzeichnet, dass** die Perforationsdichte der Polyolefinfolie im Bereich von 1 bis 100 Perforationen/cm^2 liegt und dass die Perforationen individuell einen Bereich im Bereich von 0,0004 bis 0,01 mm^2 haben.

2. Spender gemäß Anspruch 1 oder Anspruch 2, wobei die Perforationen der flexiblen Polyolefinfolie indivi-

duelle Bereiche im Bereich von 0,0007 mm^2 bis 0,006 mm^2 und eine Perforationsdichte von 1 bis 10 Perforationen pro cm^2 Folie haben.

3. Spender gemäß einem der vorangehenden Ansprüche, wobei die perforierte flexible Polyolefinfolie anfänglich mit einem wasserlöslichen Polymer beschichtet ist.

4. Vorrichtung zur Anordnung in einer Geschirrspülmaschine, die eine Reihe von Spendern gemäß einem der vorangehenden Ansprüche umfasst, die in der Vorrichtung gehalten werden.

5. Verfahren zur Bereitstellung einer kontrollierten Freisetzung eines oder mehrerer aktiver Geschirrspül-Ingredienzien in die Geschirrspülmaschine über mehrere Geschirrspülzyklen, wobei das Verfahren die Schritte des Verpackens einer Zusammensetzung, die ein oder mehrere aktive Ingredienzien enthält, in einen Spender gemäß einem der Ansprüche 1 bis 5, Anbringen des Spenders an einer Geschirrspülmaschine vor Beginn eines Geschirrspülzyklus und Belassen desselben in der Geschirrspülmaschine für mehrere Geschirrspülzyklen.

Revendications

1. Distributeur destiné à être utilisé à l'intérieur d'un lave-vaisselle automatique pour fournir la libération contrôlée d'une ou de plusieurs matières actives de lavage dans le lave-vaisselle sur plusieurs cycles de lavage, le distributeur comprenant une feuille de polyoléfine souple perforée qui est en communication de fluide avec une composition ayant une ou plusieurs matières actives de lavage, **caractérisé en ce que** la densité de perforation de la feuille de polyoléfine est de 1 à 100 perforations/cm^2 et **en ce que** les perforations ont individuellement une surface de 0,0004 à 0,01 mm^2.

2. Distributeur selon la revendication 1 ou la revendication 2, dans lequel les perforations de la feuille de polyoléfine souple ont des surfaces individuelles de 0,0007 mm^2 à 0,006 mm^2, et une densité de perforation de 1 à 10 perforations par cm^2 de feuille.

3. Distributeur selon l'une quelconque des revendications précédentes, dans lequel la feuille de polyoléfine souple perforée est initialement recouverte avec un polymère soluble dans l'eau.

4. Dispositif destiné à être positionné dans un lave-vaisselle automatique, qui comprend un certain nombre de distributeurs selon l'une quelconque des revendications précédentes, retenus dans le dispositif.

5. Procédé de fourniture d'une libération contrôlée d'une ou plusieurs matières actives de lavage dans le lave-vaisselle sur plusieurs cycles de lavage, le procédé comprenant les étapes consistant à emballer une composition contenant la ou les substances actives dans un distributeur selon l'une quelconque des revendications 1 à 5, ajouter le distributeur dans un lave-vaisselle avant le début d'un cycle de lavage, et le laisser dans le lave-vaisselle pendant plusieurs cycles de lavage.

REFERENCES CITED IN THE DESCRIPTION

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