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(54) **Cleaning article**

(57) A detergence article is described, comprising a flexible carrier, not soluble in water, at least one detergent component and at least one bleaching agent. The invention also relates to a process for obtaining a detergence article and its use for washing by hand, in washing machines, in dishwashers, for the cleaning of hard surfaces, such as plates, glasses, cutlery, etc.

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Description

[0001] The present invention relates to a detergence article.

[0002] In the field of detergence products, the necessity is increasingly felt for using products which are not only effective in removing dirt, but also have a further bleaching action, in addition to the cleaning action.

[0003] This requirement is continuously growing in the field of household cleaning, in the washing of clothes or linen by hand or in washing machines, in the washing of dishes by hand or in dishwashers and/or for the cleaning of hard surfaces. In particular, the request has considerably increased for multi-application or multi-effect products, i.e. versatile products which can be used in different household contexts and which allow different results to be obtained contemporaneously.

[0004] The market is becoming more and more oriented towards supported detergent products and/or additives for detergence, or the like. The presence of a carrier does in fact allow a greater facility of use for the final user, which is linked to a simpler dosage of the product and also a more convenient form of application.

[0005] The use of carriers pre-impregnated with a detergent avoids problems associated with an excessive or limited dosage, accidental leakages of the product, etc.

[0006] The field of detergence products containing premeasured quantities of detergent and/or other functional washing additives is consequently rapidly developing.

[0007] Attempts have been in the state of the art to obtain this result with different approaches. A first approach consists of the use of carriers in the form of sachets or fabric, impregnated, laminated or covered with a layer of detergent and/or additive, not soluble in water. The possibilities of formulation for this type of article also depend on requisites of an aesthetic nature, as the carrier cannot obviously be impregnated over certain values as the end-product must not be wet or sticky. The article on the other hand should neither be too hard or fragile, to allow its easy use for the user. The second type of approach envisages the use of carriers soluble in water.

[0008] In the range of detergence products the production of a detergence article which combines both the effect linked to the presence of a solution containing surface-active agents and enzymes, and the effect linked to the presence of an additive or bleaching agent, is of particular interest.

[0009] The combination of these two components, however, is difficult to obtain for various reasons, the most important of which is that the additive or bleaching agent tends to make the detergent component inactive, in particular when it has an enzymatic action. The two components in fact tend to interact with each other during storage before use.

[0010] Furthermore, in the case of components in aqueous solution, the enzymes require complex stabilizing systems, whereas in the case of solid components it is in any case necessary to use particular enzymes or stabilizing systems, due to the oxidizing environment.

[0011] For these reasons, the state of the art has become oriented towards double-action compositions packaged in twin-compartment bottles, wherein the detergent/enzymatic component does not enter into contact with the bleaching component during storage but only at the moment of use. These double-container systems however require rather complex closing and release systems.

[0012] The Applicant has now surprisingly found a detergence article which overcomes the drawbacks of the state of the art described above.

[0013] An object of the present invention therefore relates to a detergence article comprising a flexible carrier, not soluble in water, at least one detergent component and at least one bleaching agent.

[0014] A further object of the present invention relates to the use of a detergence article comprising a flexible carrier, not soluble in water, at least one detergent component and at least one bleaching agent, for washing by hand, in washing machines, in dishwashers, for the cleaning of hard surfaces, such as, for example, plates, glasses, cutlery, etc.

[0015] The support acts as a carrier of the detergent component and bleaching agent. Furthermore the carrier can have a coadjuvant mechanical cleaning action.

[0016] The detergent component is in the form of a powder, paste, gel or aqueous solution, containing a detergent selected from non-ionic surface-active agents, amphoteric surface-active agents and/or cationic surface-active agents, anionic surface-active agents and mixtures thereof.

[0017] Surface-active agents which can be used for the purposes of the invention are non-ionic surface-active agents, in particular linear or branched aliphatic alcohols, having a chain containing from 8 to 15 carbon atoms condensed with from 3 to 12 moles of alkylene-oxide per mole of alcohol, and/or amphoteric surface-active agents, in particular alkyl-betaine, alkylamido-betaine or alkylamino-oxides.

[0018] The non-ionic surface-active agents are preferably linear or branched aliphatic alcohols having a chain containing from 8 to 15 carbon atoms condensed with from 3 to 12 moles of ethylene-oxide and/or from 3 to 12 moles of a mixture of ethylene-oxide/propylene-oxide per mole of alcohol.

[0019] In particular, the non-ionic surface-active agents are present in the detergent component according to the present invention in a quantity varying from 3 to 40% by weight, and preferably from 4 to 30% by weight, even more preferably from 6 to 15%, with respect to the total weight of the detergent component and bleaching agent.

[0020] A preferred detergent component according to the present invention contains linear or branched C_8-C_{14} ethoxylated (3-8 EO) alkyl alcohols in a quantity ranging from 1 to 20% by weight and linear or branched C_8-C_{15}

ethoxylated or ethoxyl-propoxylated (5-12 EO/PO)) alkyl alcohols in a quantity ranging from 2 to 30% by weight, with respect to the total weight of the detergent component and bleaching agent.

[0021] More preferably, a detergent component for the article according to the present invention contains linear or branched C_8-C_{11} ethoxylated (3-8 EO) alkyl alcohols in a quantity ranging from 1 to 16% by weight, and linear or branched C_8-C_{15} ethoxylated or ethoxyl-propoxylated (5-12 EO/PO)) alkyl alcohols in a quantity ranging from 6 to 28% by weight, with respect to the total weight of the detergent component and bleaching agent.

[0022] The amphoteric surface-active agents are preferably selected from alkyl-betaine having the following formula $RR'_2N^{(+)}CH_2CO_2^{(-)}$ wherein R represents a linear or branched, saturated or unsaturated, alkyl chain having from 9 to 20 carbon atoms and R' is a C_1-C_3 alkyl group.

[0023] The amphoteric surface-active agents are preferably selected from alkylamido-betaine having the following formula R-CONH- $(CH_2)_n$ $R'_2N^{(+)}CH_2CO_2^{(-)}$, wherein R represents a linear or branched, saturated or unsaturated alkyl chain, having from 9 to 20 carbon atoms, R' is a C_1-C_3 alkyl group and n is an integer ranging from 2 to 6, preferably equal to 2 or 3.

[0024] Amphoteric surface-active agents suitable for detergent components according to the present invention are also alkylamino-oxides of the type RR'_2NO, wherein R represents a linear or branched, saturated or unsaturated, alkyl chain, having from 10 to 20 carbon atoms, R' is a C_1-C_3 alkyl group.

[0025] The amphoteric surface-active agents can be present in the detergent component according to the present invention in a quantity varying from 0.01 to 20.0% by weight, more preferably from 0.1 to 10.0% by weight, with respect to the total weight of the detergent component and bleaching agent.

[0026] In particular, the detergent component according to the present invention can also comprise cationic surface-active agents, preferably quaternary ammonic salts.

[0027] The quaternary ammonium salts have the following formula $R'_2R''R'''N^{(+)}X^{(-)}$ wherein R', R'', R''' are linear or branched, saturated or unsaturated, C_1-C_{20} alkyl chains, or $Ar(CH_2)_n$ arylalkyl groups wherein n is an integer ranging from 1 to 12 and Ar is a group selected from phenyl and substituted phenyl.

[0028] R' is preferably a methyl group, R'' is an Ar $(CH_2)_n$ group wherein n is an integer ranging from 1 to 6, preferably equal to 1, Ar is a phenyl group, R''' is a linear or branched, saturated or unsaturated, alkyl chain, having from 8 to 20 carbon atoms and X is an anion, preferably selected from chloride, sulfate, methylsulfate, acetate or propionate.

[0029] The cationic surface-active agents are present in the detergent component according to the present invention in a quantity varying from 0.01 to 2.0% by weight, more preferably from 0.1 to 0.6% by weight, with respect to the total weight of the detergent component and bleaching agent.

[0030] In particular, the detergent component according to the present invention can also comprise anionic surface-active agents, preferably sodium dodecylbenzenesulfonate, sodium alkanesulfonates, alkyl sulfates, alkylether sulfates, sulfonated alpha-olefins and mixtures thereof, alcohol-ether sulfates, alkylsulfosuccinates, etc.

[0031] The anionic surface-active agents are present in the detergent component in a quantity varying from 1 to 70% by weight, preferably from 2 to 40%, even more preferably from 2 to 20 %, with respect to the total weight of the detergent component and bleaching agent.

[0032] The detergent component of the article according to the present invention also comprises enzymes such as further detergent agents.

[0033] The enzymes present in the detergent component according to the present invention are selected from amylase, protease, cellulase and mixtures thereof. They are present in the detergent composition in a quantity varying from 0.1 to 4% by weight, preferably from 0.5 to 2% by weight with respect to the total weight of the detergent component and bleaching agent.

[0034] The detergent component of the article according to the present invention can also comprise phosphonates, polycarboxylates, cmc, optical bleaches, soaps, antifoam agents, perfumes, etc.

[0035] The preferred detergent component for the article according to the present invention includes sodium dodecylbenzenesulfonate, as anionic surface-active agent, polyethoxylated alcohol 7 moles EO, as non-ionic surface-active agent, and vegetable soaps.

[0036] The bleaching additive of the article according to the present invention is a compound selected from perborates, percarbonates, organic peracids, TAED-percarbonate (tetra-acetylenediamine), DADHT (1,5-diacetyl-2,4-dioxohexahydro-1,3,5-triazine), DOBA (decanoyloxybenzoic acid), cyanomethyltrialkylammonium salts, PAP (phthalimidoperoxyhexanoic acid), SNOB.

[0037] The preferred bleaching additive for the detergence article according to the present invention is selected from TAED-percarbonate and PAP. PAP is even more preferred.

[0038] These additives are characterized in that they exert an effective bleaching action already at water temperatures ranging from 30°C to 60°C, consequently allowing a considerable energy saving with respect to bleaching additives which require higher temperatures to eliminate various kinds of stains and obtain a bleaching action.

[0039] The bleaching agent is present in the article according to the present invention in a quantity ranging from 1 to 60% by weight, more preferably from 2 to 30% by weight, even more preferably from 3 to 15% by weight, with respect to the total weight of the detergent component and bleaching agent.

[0040] In particular, when the detergent article according to the present invention has a quantity of surface-

active agent which is greater than the quantity of bleaching agent, the article according to the present invention is a detergent product to be used directly as the sole detergent agent.

[0041] When the quantity of bleaching agent is greater than the quantity of surface-active agent, the article according to the present invention is a bleaching product to be used as additive combined with a further detergent product.

[0042] In the case of the use of the detergent article according to the present invention in dishwashers, an article is used which comprises a detergent component in a lower quantity with respect to the bleaching agent, preferably PAP: for this type of use, the article is however a detergent and not an additive.

[0043] In particular the carrier of the article according to the present invention is flexible, non-soluble in water, solid or substantially solid.

[0044] The carrier can be single-layered or multi-layered, it can have any form and dimension such as, for example, a handkerchief, a piece of cloth, a bag, a sachet. The carrier preferably has the form of a handkerchief or a sachet.

[0045] It can have a dense or open structure and examples of material suitable for the carrier of the article according to the present invention are porous sheets, sponges, paper, fabric and/or non-woven fabric. Included in the scope of the present invention are substrates characterized by an absorption capacity range, thickness, density of the fibres, which are such as to guarantee the wet carrier a sufficient resistance for maintaining its structural integrity until the complete washing cycle and/or cycle of use has been completed.

[0046] The carrier is preferably a woven fabric or non-woven fabric. The woven fabric or non-woven fabric are natural and/or synthetic fabrics. The carrier can be any carrier of the cellulose type such as paper, a natural material such as cotton or a synthetic material.

[0047] The carrier is preferably a natural and/or synthetic non-woven fabric, more preferably a synthetic non-woven fabric.

[0048] Non-woven fabrics which can be conveniently used are spunlaced, spunbonded, thermobonded, air-laided non-woven fabrics, where said terms spun-laced, spunbonded, thermo-bonded, airlaided indicate both the non-woven fabrics and the techniques used for obtaining them, well known in the art.

[0049] The fibres preferably used for obtaining these non-woven fabrics are polyester (PE) fibres, polypropylene (PP) fibres, polylactic (PLA) fibres, polyethylenesulfone (PES) fibres, acrylic polymers, regenerated cellulose, polyamidic fibres, cotton, viscose or mixtures thereof. The carrier can also consists of 100% regenerated cellulose, for example: lyocell® (i.e. regenerated cellulose fibre, obtained with a dissolution and spinning process in an organic solvent) or tencell®.

[0050] The carrier preferably has a weight ranging from 150 g/m^2 to 50 g/m^2, more preferably from 100 g/m^2 to 60 g/m^2. The fibres of the carrier preferably have dimensions ranging from 0.5 dtex to 5 dtex, preferably from 1 dtex to 2 dtex.

[0051] As mentioned above, the carrier of the article according to the present invention can be dense or it can have an open cell structure and therefore have a high volume of empty spaces which represent the space of the carrier which is not occupied.

[0052] Substrates consisting of multilayer paper structures, for example, comprise layers having protuberances, whose ends are melted and welded. This paper structure has empty spaces between the protuberant portions of the folds, as also between the same fibres of the layers of paper. A non-woven fabric also has these empty spaces between the fibres. The empty spaces in the carrier can be varied by modifying the density of the fibres of the carrier. In general, substrates with a high quantity of empty space have a low fibre density, whereas substrates with a low quantity of empty space have a high fibre density.

[0053] The carrier is selected so as to have a sufficient charge capacity with the detergent component and bleaching additive. The correct charge can be determined in relation to the dimensions of the final carrier sheet and quantity of detergent to be released. There are no particular limitations in the dimensions. Non-woven fabrics with high charge capacities generally also have higher costs and consequently this aspect must also be taken into account in selecting the most suitable carrier.

[0054] In particular, the application of the detergent component, in the form of an aqueous solution, gel, paste or powder, to the carrier in the article according to the present invention can be effected according to many different methods. A typical example is by the application of a coating by impregnation, slit die extrusion, inverse roll coating, by means of immersion or wringing, by calendering, or by means of any other method in which the carrier is left a sufficient amount of time for being completely saturated with the detergent coating solution. The elimination of the water, when necessary, can be effected through one or more drying passages according to the known art.

[0055] The application of the detergent component by calendering is effected by depositing the detergent component in the form of a paste, gel or aqueous solution, by means of two coupled cylinders, the first which rotates in a clockwise direction and the second which rotates in an anticlockwise direction. The distance between the two cylinders determines the quantity of detergent component which is deposited on the non-woven fabric carrier which runs beneath the same cylinders.

[0056] In particular, when the detergent component is in the form of an aqueous solution, the application by calendering can be effected by means of a preparation phase of a very dense mixture (with a consistency similar to honey) of the detergent component, obtained by adding the thickener selected from polyacrylates, carragenin, xanthan rubbers, cellulose polymers, etc., under stir-

ring.

[0057] The quantity of dense mixture of the detergent component which is applied to the carrier ranges from 30 to 600 g/m^2 referring to the carrier, preferably from 65 to 550 g/m^2.

[0058] The bleaching additive can be applied directly as a coating on the carrier before impregnating the carrier with the detergent component, so that the detergent component forms a coating which covers the bleaching agent. Alternatively, it is also possible to apply a suspension of a bleaching agent by spreading on a non-woven fabric carrier already covered with the detergent component.

[0059] It is also possible to envisage a multilayer carrier in which the detergent component in powder form and the bleaching in powder form are entrapped between two sandwich-coupled layers of carrier, or the carrier in the form of a pocket or sachet containing the bleaching agent is subsequently impregnated with the detergent component in the form of a paste, gel or aqueous solution.

[0060] Two different supporting strips can also be envisaged, the first impregnated according to known methods with the detergent component and the second with the bleaching agent, subsequently coupled to form a multilayer carrier.

[0061] Alternatively, the carrier consisting of non-woven fabric already covered with the detergent component can be printed serigraphically with the bleaching agent.

[0062] According to this solution, the process comprises a preparation phase of a very dense mixture (having a consistency similar to honey) of the bleaching additive obtained by dispersing the bleaching additive in water and adding the thickener selected from polyacrylates, carragenin, xanthan rubbers, cellulose polymers, etc., under stirring.

[0063] The process also preferably comprises an addition phase to the mixture of the dispersing agent to stabilize the compound.

[0064] Once the compound based on the bleaching agent has been prepared in a suitable solution or in a composition with the further ingredients mentioned above, said compound is applied to the carrier of non-woven fabric by means of application methods known in the field such as, for example, impregnation, spreading, calendering or printing, as described in detail below.

[0065] The product, object of the present invention, can be obtained by combining, in any way, one of the carriers listed above with the detergent component and the bleaching additive. The preferred end-product comprises the carrier made of non-woven fabric to which at least one detergent component based on sodium dodecylbenzenesulfonate, vegetable soaps and ethoxylated alcohols, preferably polyethoxylated alcohol 7moles EO, which has the function of detergent and at least one bleaching agent, PAP, which has the function of cleaning and bleaching, are fixed.

[0066] A further object of the present invention therefore relates to a process for the preparation of a detergence article comprising a flexible carrier, not soluble in water, at least one detergent component and at least one bleaching agent.

[0067] Said process comprises the following passages:

a) selecting a carrier comprising one of the following materials: natural and/or synthetic woven fabric, natural and/or synthetic non-woven fabric and paper;
b) applying at least one bleaching additive to the carrier;
c) drying the semi-processed carrier, if necessary;
d) applying at least one detergent component on the semi-processed carrier obtained with passage d);
e) drying the carrier, if necessary, so as to obtain the end-product.

[0068] As already mentioned, the passages b) and d) can be inverted. An object of the invention, in fact, also relates to a process for the preparation of a detergence article comprising a flexible carrier, not soluble in water, at least one detergent component and at least one bleaching agent, which comprises the following passages:

a) selecting a carrier comprising one of the following materials: natural and/or synthetic woven fabric, natural and/or synthetic non-woven fabric and paper;
b) applying at least one detergent composition to the carrier;
c) drying the semi-processed carrier, if necessary;
d) applying at least one bleaching additive on the semi-processed carrier obtained with passage b);
e) drying the carrier, if necessary, so as to obtain the end-product.

[0069] The passages from b) to e) are preferably effected by means of impregnation, spraying, calendering, printing and/or plating techniques which are all known in the art.

[0070] It is even more advantageously convenient to use conventional dyeing techniques.

[0071] The relationship established between detergent component, additive and carrier can be: absorption, hydrogen bond, electrostatic forces, for example ion/ion or ion/dipole interactions, incorporation, chemical or physical bond, etc.

[0072] When the dyeing technique is adopted, it is possible to use methods such as, for example, Torpedo dyeing, Jigger, Flow, Jet dyeing, Pad-batch dyeing, impregnation to exhaustion.

[0073] In particular, in the dyeing technique, phase b) comprises the application on the carrier of a detergent component or of a solution containing the bleaching additive at a suitable concentration.

[0074] Furthermore, according to the Pad-batch method or "exhaustion" method, the impregnating solution is an aqueous solution containing the bleaching compound or the detergent component and caustic soda.

[0075] The "torpedo" method, on the contrary, envisages a phase b) comprising a first rinsing of the carrier, contact with an aqueous solution of the detergent or bleaching agent, heating to a temperature ranging from 40° to 70°C. Said heating preferably takes place gradually by 1°C per minute up to the preferred temperature of 50°C. contact is left for 15 minutes, after which NaOH is slowly added (over approximately 10 minutes). The solution is maintained for a period ranging from 1 minute to 60 minutes, preferably from 1 minutes to 20 minutes, more preferably about 10 minutes.

[0076] When passage c) is effected with the Pad-Batch technique, the carrier passes into a tank with the solution, where it is impregnated; the elimination of the excess detergent or bleaching additive comprises the passage of the carrier for example through two or more rolls and wringing (foulard technique). The wringing pressure depends on the quantity of detergent or additive to be left in the end-material and on the concentration of the detergent solution or additive applied in passage a). Furthermore, after the wringing, the wet carrier is left to rest for a period ranging from 30' to 24 hours, preferably from 3 to 4 hours, possibly wound and in rotation.

[0077] Passage b) can also be effected at room temperature.

[0078] In passage c), the carrier is dried, preferably in an oven, at a temperature ranging from 70°C to 200°C, preferably from 100°C to 170°C, more preferably around 120°C for a time which depends on the quantity of additive and solvent present, the temperature and efficiency of the drying system.

[0079] In order to obtain a material containing a quantity of bleaching additive of about 2% by weight with respect to the weight of the carrier, for example, it is possible to operate in various ways on the basis of the type of method used. If the "torpedo" method is used, for example, after introducing the carrier of non-woven fabric into the conventional apparatus charged with water, the bleaching additive is added in a quantity directly proportional to the weight of said fabric. In other words, if the weight of the carrier is 100 g/m^2 and a quantity of additive of 2% by weight is required, the quantity of additive to be added is 2 grams.

[0080] If the pad-batch method is adopted, on the other hand, again requiring a quantity of bleaching additive on the carrier of 2% by weight with respect to the weight of the carrier, for a carrier of 100 g/m^2 a solution containing 4% by weight of additive and be prepared and a wringing effected so as to obtain an absorption of 50% of the solution on the carrier. Alternatively, with the same weight of the carrier, it is possible to prepare a solution at 1% and effect a wringing which allows an absorption of 200% of said solution.

[0081] An oven is preferably used in which the carrier of non-woven fabric is suspended in the heated chamber so as not to touch parts of the oven itself. In particular, equipment of the RAM type can be used, which is completely conventional and which advantageously allows an excellent temperature control, substantially no contact with the oven, the possibility of controlling the stability of the carrier with respect to the height, elongation (stretching) and basis weight. All of this favours the stability and resistance of the carrier in washing-machines.

[0082] The above parameters can be easily regulated by experts in the field in relation to the material to be obtained (i.e. more or less impregnated with detergent and/or additive) and machinery available. If the oven is extremely efficient, for example, the drying time can be considerably reduced and the whole process accelerated; if a foulard technique is adopted in which the wringing is effected with three cylinders, the pressure applied can be lower than that used in the case of 2-cylinder wringing, etc.

[0083] Passage d) can be effected using any known method in the field such as, for example, impregnation, calendering, spreading and printing. The preferred method is calendering or printing and, in particular serigraphic printing.

[0084] For serigraphic printing, a dense mixture is prepared, comprising the bleaching agent and the thickener, as specified above.

[0085] In passage d), the dense mixture, prepared for example as described above, can be applied by printing on the carrier coming from the drying passage c), preferably by serigraphic printing.

[0086] The quantity of dense mixture which is applied to the carrier ranges from 30 to 200 g/m^2 referring to the carrier, preferably from 50 to 150 g/m^2, even more preferably approximately 20 g/m^2.

[0087] The quantity of dense mixture and therefore of bleaching additive which can be applied to the carrier also depends on the different uses of the detergence article according to the invention, as indicated above.

[0088] In passage e), the carrier is dried at a temperature not higher than 120°C, preferably about 100°C.

[0089] The passages a)-d) are preferably effected in continuous (torpedo method), i.e. the carrier made of non-woven fabric is subjected to impregnation, wringing and drying without intermediate passages or pauses (for possibly allowing a better binding of the additive to the carrier) between one treatment and another. All this is possible as the additive has a high affinity for the carrier and consequently the desired quantity of additive is bound to the carrier almost instantaneously and it is not necessary to leave the carrier in impregnation for a long period of time.

[0090] After the drying passage c), the semi-processed product can be rolled up and passed to another machine where it is unrolled and subjected to passages d) and e). Alternatively, the semi-processed product of passage c) is not rolled up, but is sent immediately for the application of the detergent component (passage d) and then the drying (passage e)) and is then rolled up. In other words, the production process can be carried out in continuous, with a single machine, from passage a) to passage e), or batchwise by effecting passages

a)-c) with one machine and passages d)-e) with a second machine.

[0091] The detergence article according to the present invention is normally inserted into conventional or professional washing-machines or dish-washers before the beginning of the washing cycle.

[0092] When the washing cycle starts, the thickener or detergent dissolves in water releasing the bleaching agent which, when it is dissolved in water, exerts its bleaching and cleaning function, whereas the detergent component exerts its detergent function.

[0093] The number of sheets of the detergence article according to the present invention which are used for each washing depends on the weight of the laundry or quantity of dishes and their dirtiness.

[0094] The detergence article according to the present invention can also be used for hand washing and the cleaning of hard surfaces, after dampening with water.

Claims

1. A detergence article comprising a flexible carrier, not soluble in water, at least one detergent component and at least one bleaching agent.

2. The article according to claim 1, **characterized in that** the detergent component is in the form of a powder, paste, gel or aqueous solution, containing at least one detergent selected from non-ionic surface-active agents, amphoteric surface-active agents and/or cationic surface-active agents, anionic surface-active agents and mixtures thereof.

3. The article according to claim 2, **characterized in that** the non-ionic surface-active agents are selected from linear or branched aliphatic alcohols, having a chain containing from 8 to 15 carbon atoms condensed with from 3 to 12 moles of alkylene-oxide per mole of alcohol.

4. The article according to claim 2, **characterized in that** the non-ionic surface-active agents are present in a quantity varying from 3 to 40% by weight, and preferably from 4 to 30% by weight, even more preferably from 6 to 15% by weight, with respect to the total weight of the detergent component and bleaching agent.

5. The article according to claim 2, **characterized in that** the detergent component contains linear or branched C_8-C_{14} ethoxylated (3-8 EO) alkyl alcohols in a quantity ranging from 1 to 16% by weight and/or linear or branched C_8-C_{15} ethoxylated or ethoxyl-propoxylated (5-12 EO/PO)) alkyl alcohols in a quantity ranging from 6 to 28% by weight, with respect to the total weight of the detergent component and bleaching agent.

6. The article according to claim 2, **characterized in that** the amphoteric surface-active agents are preferably selected from alkyl-betaine having the following formula $RR'_2N^{(+)}\ CH_2CO_2^{(-)}$ wherein R represents a linear or branched, saturated or unsaturated, alkyl chain having from 9 to 20 carbon atoms and R' is a C_1-C_3 alkyl group.

7. The article according to claim 2, **characterized in that** the amphoteric surface-active agents are selected from alkylamido-betaine having the following formula $R\text{-}CONH\text{-}(CH_2)_n R'_2N^{(+)}CH_2CO_2^{(-)}$, wherein R represents a linear or branched, saturated or unsaturated alkyl chain, having from 9 to 20 carbon atoms, R' is a C_1-C_3 alkyl group and n is an integer ranging from 2 to 6, preferably equal to 2 or 3.

8. The article according to claim 2, **characterized in that** the amphoteric surface-active agents are alkylamino-oxides of the type RR'_2NO, wherein R represents a linear or branched, saturated or unsaturated, alkyl chain, having from 10 to 20 carbon atoms, R' is a C_1-C_3 alkyl group.

9. The article according to claim 2, **characterized in that** the amphoteric surface-active agents are present in the detergent component in a quantity varying from 0.01 to 20.0% by weight, more preferably from 0.1 to 10.0% by weight, with respect to the total weight of the detergent component and bleaching agent.

10. The article according to claim 2, **characterized in that** the cationic surface-active agents are quaternary ammonium salts.

11. The article according to claim 2, **characterized in that** the cationic surface-active agents are quaternary ammonium salts with the following formula $R'_2R''R'''N^{(+)}X^{(-)}$ wherein R', R'' , R''' are linear or branched, saturated or unsaturated, C_1-C_{20} alkyl chains, or $Ar(CH_2)_n$ arylalkyl groups wherein n is an integer ranging from 1 to 12 and Ar is a group selected from phenyl and substituted phenyl.

12. The article according to claim 11, **characterized in that** R' is a methyl group, R'' is an $Ar(CH_2)_n$ group wherein n is an integer ranging from 1 to 6, preferably equal to 1, Ar is a phenyl group, R''' is a linear or branched, saturated or unsaturated, alkyl chain, having from 8 to 20 carbon atoms and X is an anion, preferably selected from chloride, sulfate, methylsulfate, acetate or propionate.

13. The article according to claim 2, **characterized in that** the cationic surface-active agents are present in the detergent component in a quantity varying from 0.01 to 2.0% by weight, more preferably from 0.1 to

0.6% by weight, with respect to the total weight of the detergent component and bleaching agent.

14. The article according to claim 2, **characterized in that** the anionic surface-active agents are selected from sodium dodecylbenzenesulfonate, sodium alkanesulfonates, alkyl sulfates, alkylether sulfates, sulfonated alpha-olefins and mixtures thereof, alcohol-ether sulfates, alkylsulfosuccinates, preferably sodium dodecylbenzenesulfonate.

15. The article according to claim 2, **characterized in that** the anionic surface-active agents are present in the detergent component in a quantity varying from 1 to 70% by weight, preferably from 2 to 40%, even more preferably from 2 to 20%, with respect to the total weight of the detergent component and bleaching agent.

16. The article according to claim 1, **characterized in that** it also comprises enzymes as further detergent agents.

17. The article according to claim 15, **characterized in that** the enzyme is selected from amylase, protease, cellulase and mixtures thereof.

18. The article according to claim 15, **characterized in that** the enzyme is present in the detergent component in a quantity varying from 0.1 to 4% by weight, preferably from 0.5 to 2% by weight with respect to the total weight of the detergent component and bleaching agent.

19. The article according to claim 1, **characterized in that** it also comprises phosphonates, polycarboxylates, cmc, optical bleaches, soaps, vegetable soaps, antifoam agents, perfumes.

20. The article according to claim 1, **characterized in that** the detergent solution comprises sodium dodecylbenzenesulfonate, as anionic surface-active agent, polyethoxylated alcohol 7moles EO as non-ionic surface-active agent and vegetable soaps.

21. The article according to claim 1, **characterized in that** the bleaching additive is a compound selected from perborates, percarbonates, organic peracids, TAED-percarbonate (tetra-acetylenediamine), DADHT (1,5-diacetyl-2,4-dioxohexahydro-1,3,5-triazine), DOBA (decanoyloxybenzoic acid), cyanomethyltrialkylammonium salts, PAP (phthalimidoperoxyhexanoic acid), SNOB.

22. The article according to claim 21, **characterized in that** the bleaching additive is selected from TAED-percarbonate and PAP, preferably PAP.

23. The article according to claim 1, **characterized in that** the bleaching agent is present in a quantity ranging from 1 to 60% by weight, more preferably from 2 to 30% by weight, even more preferably from 3 to 15% by weight, with respect to the total weight of the detergent component and bleaching agent.

24. The article according to claim 1, **characterized in that** the carrier is flexible, non-soluble in water, solid or substantially solid.

25. The article according to claim 24, **characterized in that** the carrier is single-layered or multi-layered, in any form and dimension such as, for example, a handkerchief, a piece of cloth, a bag, a sachet, a strip, preferably in the form of a handkerchief or a sachet, with a dense or open structure.

26. The article according to claim 24, **characterized in that** the carrier is selected from porous sheets, sponges, paper, woven and/or non-woven fabric.

27. The article according to claim 24, **characterized in that** the carrier is a natural and/or synthetic woven or non-woven fabric.

28. The article according to claim 24, **characterized in that** the carrier is a synthetic spunlaced, spunbonded, thermobonded, airlaided non-woven fabric where said terms spunlaced, spunbonded, thermobonded, airlaided.

29. The article according to claim 28, **characterized in that** the carrier of non-woven fabric is based on polyester (PE) fibres, polypropylene (PP) fibres, polylactic (PLA) fibres, polyethylenesulfone (PES) fibres, acrylic polymers, regenerated cellulose, polyamidic fibres, cotton, viscose or mixtures thereof, 100% regenerated cellulose.

30. The article according to claim 24, **characterized in that** the carrier has a weight ranging from 150 g/m^2 to 50 g/m^2, preferably from 100 g/m^2 to 60 g/m^2.

31. The article according to claim 24, **characterized in that** the fibres of the carrier have dimensions ranging from 0.5 dtex to 5 dtex, preferably from 1 dtex to 2 dtex.

32. The article according to claim 25, **characterized in that** it envisages a multilayer carrier wherein the detergent component in powder form and the bleaching agent in powder form are entrapped between two sandwich-coupled layers of carrier.

33. The article according to claim 25, **characterized in that** it envisages a carrier in the form of a pocket or sachet containing the bleaching agent, subsequently

impregnated with the detergent component in the form of a paste, gel or aqueous solution.

34. The article according to claim 25, **characterized in that** it envisages a carrier consisting of two different strips, the first impregnated with the detergent component and the second with the bleaching agent, subsequently coupled to form a multilayer carrier.

35. A process for the preparation of a detergence article comprising a flexible carrier, not soluble in water, at least one detergent component and at least one bleaching agent, **characterized in that** it comprises the following passages:

a) selecting a carrier comprising one of the following materials: natural and/or synthetic woven fabric, natural and/or synthetic non-woven fabric and paper;
b) applying at least one bleaching additive to the carrier;
c) drying the semi-processed carrier, if necessary;
d) applying at least one detergent component on the semi-processed carrier obtained with passage d);
e) drying the carrier, if necessary, so as to obtain the end-product.

36. A process for the preparation of a detergence article comprising a flexible carrier, not soluble in water, at least one detergent component and at least one bleaching agent, **characterized in that** it comprises the following passages:

a) selecting a carrier comprising one of the following materials: natural and/or synthetic woven fabric, natural and/or synthetic non-woven fabric and paper;
b) applying at least one detergent component to the carrier;
c) drying the semi-processed carrier, if necessary;
d) applying at least one bleaching additive on the semi-processed carrier obtained with passage b);
e) drying the carrier, if necessary, so as to obtain the end-product.

37. The process according to one of the claims 35 or 36, **characterized in that** passages b) to e) are effected by means of impregnation, calendering, spraying, printing and/or plating techniques.

38. Use of a detergence article comprising a flexible carrier, not soluble in water, at least one detergent component and at least one bleaching agent for hand-washing, washing in washing-machines, in dish-washers, for the cleaning of hard surfaces, such as for example, plates, glasses, cutlery, etc.

39. Use of a detergence article according to any of the claims from 1 to 34.

40. Use according to claim 38, as detergent product, wherein the article has a higher quantity of surface-active agent with respect to the quantity of bleaching agent.

41. Use according to claim 38, as bleaching additive, wherein the article has a higher quantity of bleaching agent with respect to the quantity of surface-active agent.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 10 8527

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 July 2007	CULMANN, J

CATEGORY OF CITED DOCUMENTS

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