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(54) Title: MULTI STEP WASHING PROCESS

(57) Abstract: Four step washing process for washing textiles in an aqueous wash liquor, comprising the following steps: • I) white and/or colour-stable coloured textiles in need of cleaning are contacted with an aqueous wash liquor that comprises chlorine bleach, • II) the textiles are removed from said wash liquor, • III) a chlorine scavenger is added to said wash liquor, and • IV) colour-unstable coloured textiles in need of cleaning are contacted with said wash liquor. Detergent comprising both chlorine bleach compound and chlorine scavenger, the chlorine scavenger being set free after the chlorine bleach compound is set free when the detergent is contacted with water.



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Patent Application

MULTI STEP WASHING PROCESS

This invention relates to a process of subsequently washing robust and delicate fabrics in virtually the same wash liquor without damaging the delicate fabrics.

Besides surfactants essential to their deterative performance, detergents generally contain other components that are known collectively as washing aids and that encompass such diverse groups as foam regulators, redeposition inhibitors, bleaching agents, enzymes and dye transfer inhibitors. Particular importance is attributed to the bleaching agents, above all with regard to the boosting of washing or cleaning performance against a range of different soils. Auxiliaries such as these include substances that, in laundry detergents, support surfactant performance through the oxidative degradation of soils present on the fabric or soils present in the wash liquor after detachment from the fabric. Thus, inorganic peroxygen compounds, particularly hydrogen peroxide, and solid peroxygen compounds, which dissolve in water with release of hydrogen peroxide or so-called active oxygen, such as sodium perborate and sodium carbonate perhydrate, have long been used as oxidizing agents for disinfection and bleaching purposes. Sodium carbonate perhydrate, which is often referred to in short as sodium percarbonate, is the addition compound of hydrogen peroxide onto sodium carbonate (empirical formula $2 \text{Na}_2\text{CO}_3 \cdot 3 \text{H}_2\text{O}_2$). The carbonate salts of the other alkali metals also form H_2O_2 addition compounds. In view of its often unsatisfactory storage stability in humid environments and in the presence of other typical detergent ingredients, particularly silicate-containing builders, the alkali metal percarbonate normally has to be stabilized against the loss of active oxygen, for example by applying a coating that may comprise one or more layers.

The oxidizing effect of solid peroxygen compounds that dissolve in water with release of hydrogen peroxide, such as sodium perborate and sodium carbonate perhydrate, in dilute solutions greatly depends on temperature; sufficiently rapid bleaching of stained textiles in alkaline bleaching baths is obtained, for example, with H_2O_2 or sodium perborate only at temperatures above approximately 80°C . At lower temperatures, the oxidizing effect of the inorganic peroxygen compounds can be improved by the addition of so-called "bleach activators," which are capable of supplying peroxycarboxylic acids under the above-discussed perhydrolysis conditions and have become known in the literature for numerous proposals, chiefly from the substance classes of the N- or O-acyl compounds, for example reactive esters, polyacylated alkylenediamines, in particular N,N,N',N'-tetraacetylenethylenediamine (TAED), acylated glycolurils, in particular tetraacetylglycoluril,

N-acylated hydantoins, hydrazides, triazoles, hydrotriazines, urazoles, diketopiperazines, sulfurylamides, and cyanurates, also carboxylic acid anhydrides, in particular phthalic acid anhydride, carboxylic acid esters, in particular sodium nonanoyl oxybenzenesulfonate (NOBS), sodium isononanoyl oxybenzenesulfonate, O-acylated sugar derivatives such as pentaacetyl glucose, and N-acylated lactams, such as N-benzoylcaprolactam. The addition of these substances allows the bleaching effect of aqueous peroxide baths to be increased sufficiently that the effects that occur at temperatures around 60°C are already substantially the same as with the peroxide bath alone at 95°C.

Another approach is to employ a detergent free from bleach for textile washing, and to add a bleaching component to the wash liquor if bleaching performance is required. Particularly in countries with emerging markets, such additives are mostly based on alkali metal hypochlorites, which are normally formulated as aqueous solutions. Alternatively a chlorine bleach component may already be present in the formulation of the detergent used.

While chlorine bleach is quite effective against a number of stains often found on clothes, it tends to change the appearance of coloured fabrics due to oxidative damage to the colourants on the fabric.

If one washes, by hand or in washing machines, first white textiles and then coloured textiles in the same washing liquor, the chlorine bleach – when used for washing the white textiles – quite often will do damage to the colour of the coloured textile.

It is an object of the invention to improve colour safety in such a process.

Accordingly, the present invention relates to a process for washing textiles in an aqueous wash liquor, comprising the following steps:

- I) white and/or colour-stable coloured textiles in need of cleaning are contacted with an aqueous wash liquor that comprises chlorine bleach,
- II) the textiles are removed from said wash liquor,
- III) a chlorine scavenger is added to said wash liquor, and
- IV) colour-unstable coloured textiles in need of cleaning are contacted with said wash liquor.

By colour-stable is meant a colour which is not unacceptably changed or damaged on the textile by the treatment with chlorine bleach in step I). Accordingly, by colour-unstable is meant a colour which would be unacceptably changed or damaged on the textile by the treatment with chlorine bleach in step I).

The aqueous wash liquor that comprises chlorine bleach for step I) may be prepared from liquid or solid chlorine bleach compounds and preferably comprises additional ingredients commonly used in the washing of clothes, such as for example surfactants and/or builders.

The chlorine bleach compound used in step I) of the process according to the invention is a source of electrophilic chlorine and may be liquid or solid at 25 °C. If it is solid or it is part of a solid detergent, it preferably is selected from the group consisting of dichloroisocyanuric acid, alkali metal dichloroisocyanurates, which may be anhydrous or can be used in the form of its mono- and/or dihydrates, 1,3,5-trichloroisocyanuric acid, alkali metal 1,3,5-trichloroisocyanurates, N-chloro-sulfonamides, such as alkali metal N-chloro-(4-methyl-benzene)-sulfonamide (Chloramin® T), Calcium oxychloride, which can also be used as its mixed salt with calcium chloride and calcium hydroxide, such as $3 \text{ CaCl}(\text{OCl}) \cdot \text{Ca}(\text{OH})_2 \cdot 5 \text{ H}_2\text{O}$, and its mixtures. Preferred solid chlorine bleach compounds are alkali metal dichloroisocyanurates. Both for the cations present as counter ions for said acids and elsewhere in the present specification, sodium is the preferred alkali metal, although lithium, potassium and/or rubidium salts may also be used, if desired. Liquid chlorine bleach compounds for use in step I) of the process according to the invention may be prepared by dissolving solid chlorine bleach compounds in water, or an aqueous solution of alkali hypochlorite may be used. In one embodiment of the invention a solid detergent comprising a solid chlorine bleach compound is used for preparing the wash liquor for step I). The wash liquor of step I) according to the process of the invention, when prepared by dissolving a chlorine bleach compound or a detergent comprising a chlorine bleach compound, does comprise amounts of chlorine bleach, calculated as Cl (active chlorine), in the range of from 0.1 g/l to 10 g/l, preferably from 0.5 g/l to 2.5 g/l. Detergents to be used to prepare the washing liquor for step I) preferably comprise up to 10 % by weight, and more particularly in the range from 0.1% by weight to 3% by weight, of chlorine bleach compound.

In addition to the chlorine bleach compound, the detergent composition and, accordingly, the wash liquor in step I), may contain any other ingredients typically encountered in detergents providing they do not negatively interact with the chlorine bleach compound in an unreasonable manner.

Detergent compositions may contain a water-insoluble or, preferably, a water-soluble builder. By a "water-soluble" substance it is meant that at least 3 g/l and more particularly at least 6 g/l of the substance dissolves completely in water with a pH of 7 at room temperature. If the detergent composition does not comprise any water-insoluble builder substance, the complete builder material is preferably completely soluble at the concentration established through the quantity in which the detergent containing it is used under typical washing conditions.

Detergents used in step I) of the process of the invention preferably comprise at least 15% by weight and up to 55% by weight and, more particularly, 25% by weight to 50% by weight of water-

soluble builder. The builder material contained in the detergent composition is preferably composed of the following components:

- a) 0.1% by weight to 40% by weight alkali metal carbonate, which may also be at least partly replaced by alkali metal hydrogen carbonate,
 - b) 4% by weight to 1.5% by weight alkali metal silicate with a modulus of 1.8 to 2.5,
 - c) 0.1% by weight to 1.5 % by weight phosphonic acid and/or alkali metal phosphonate and
 - d) up to 10% by weight of monomeric and/or polymeric polycarboxylate,
- the amounts mentioned being based on the detergent as a whole. The same also applies to all amounts mentioned previously or in the following, unless otherwise specifically indicated.

With regard to component a), a preferred embodiment of compositions contains 15% by weight to 25% by weight of alkali metal carbonate, which may be at least partly replaced by alkali metal hydrogen carbonate. If both alkali metal carbonate and alkali metal hydrogen carbonate are present, component a) contains alkali metal carbonate and alkali metal hydrogen carbonate in a ratio by weight of preferably 10:1 to 1:1.

With regard to component b), a preferred embodiment of compositions contains 5% by weight to 8% by weight alkali metal silicate with a modulus of 1.8 to 2.5

With regard to component c), a preferred embodiment of compositions contains 0.5% by weight to 0.9% by weight phosphonic acid and/or alkali metal phosphonate. Phosphonic acids in the present context are also understood to include optionally substituted alkyl phosphonic acids which may also contain several phosphonic acid groups (so-called polyphosphonic acids). They are preferably selected from hydroxy and/or amino alkyl phosphonic acids and/or alkali metal salts thereof, such as for example dimethylaminomethane diphosphonic acid, 3-aminopropane-1-hydroxy-1,1-diphosphonic acid, 1-amino-1-phenylmethane diphosphonic acid, 1-hydroxyethane-1,1-diphosphonic acid, amino-tris(methylenephosphonic acid), N,N,N',N'-ethylenediamine tetrakis-(methylenephosphonic acid) and acylated derivatives of phosphorous acid, which may also be used in the form of mixtures.

With regard to component d), a preferred embodiment of compositions contains 1% by weight to 3% by weight of monomeric polycarboxylate, such as alkali metal salts of citric acid, and/or polymeric polycarboxylate, selected in particular from the polymerization or copolymerization products of acrylic acid, methacrylic acid and/or maleic acid. Of these, the homopolymers of acrylic acid are particularly preferred, those with an average molecular weight of 5,000 D to 15,000 D (PA standard) being most particularly preferred.

The detergent composition may, as a substitute for or in addition to the phosphate-free water-soluble builder, comprise water-insoluble builders, such as for example zeolite A, in amounts not exceeding 20% by weight, preferably in the range from 1% by weight to 15% by weight of the detergent; however, in also preferred embodiments, the detergent contains no other builders than those which are soluble in water, with the possible exception of small quantities of materials which may normally be present as impurities or stabilizing additives, i.e. not as builders, in other ingredients of the compositions.

The compositions may comprise anionic surfactant, preferably synthetic anionic surfactant of the sulfate or sulfonate type, such as for example alkyl benzenesulfonates, in amounts of preferably not more than 20% by weight and, more particularly, in amounts of 10% by weight to 18% by weight. Synthetic anionic surfactants particularly suitable for use in the compositions are C₈₋₂₂-alkyl and/or -alkenyl sulfates containing an alkali metal, ammonium or alkyl- or hydroxyalkyl-substituted ammonium ion as counter-cation. Derivatives of fatty alcohols containing in particular 12 to 18 carbon atoms and branched-chain analogs thereof, so-called oxoalcohols, are preferred. The alkyl and alkenyl sulfates may be produced in known manner by reaction of the corresponding alcohol component with a typical sulfating agent, more particularly sulfur trioxide or chlorosulfonic acid, and subsequent neutralization with alkali metal, ammonium or alkyl- or hydroxyalkyl-substituted ammonium bases. Suitable surfactants of the sulfate type also include sulfated alkoxylation products of the alcohols mentioned, so-called ether sulfates. Ether sulfates preferably contain 2 to 30 and, more particularly, 4 to 10 ethylene glycol groups per molecule. Suitable anionic surfactants of the sulfonate type include the alpha-sulfoesters obtainable by reaction of fatty acid esters with sulfur trioxide and subsequent neutralization, more particularly the sulfonation products derived from fatty acids containing 8 to 22 and preferably 12 to 18 carbon atoms and linear alcohols containing 1 to 6 and preferably 1 to 4 carbon atoms, and the sulfofatty acids obtainable therefrom by formal saponification. Another preferred embodiment of such compositions includes the presence of synthetic anionic surfactant of the sulfate and/or sulfonate type, more particularly fatty alkyl sulfate, fatty alkyl ether sulfate, sulfofatty acid esters and/or sulfofatty acid disalts, more particularly in a quantity of 2% by weight to 25% by weight. The anionic surfactant is preferably selected from the alkyl or alkenyl sulfates and/or alkyl or alkenyl ether sulfates in which the alkyl or alkenyl group contains 8 to 22 and more particularly 12 to 18 carbon atoms. These anionic surfactants are not normally individual substances, but rather cuts or mixtures, of which those containing more than 20% by weight of compounds containing relatively long-chain (C₁₆₋₁₈) radicals are preferred.

Other optional surface-active ingredients are soaps, especially saturated fatty acid soaps, such as the salts of lauric acid, myristic acid, palmitic acid or stearic acid, and soaps derived from natural fatty acid mixtures, for example coconut oil fatty acid, palm kernel oil fatty acid or tallow fatty acid, being suitable. Soap mixtures of which 50% by weight to 100% by weight consist of saturated C₁₂₋₁₈

fatty acid soaps and up to 50% by weight of oleic acid soap are particularly preferred. Soap is preferably present in amounts of up to 10% by weight and more particularly in quantities of 0.1% by weight to 5% by weight.

Instead of or in addition to these anionic surfactants, the compositions may contain other nonionic, zwitterionic, and/or cationic surfactants, each in amounts of preferably up to 20% by weight and, more particularly, in amounts of 0.1% by weight to 2.5% by weight.

Suitable nonionic surfactants are the alkoxyates, more particularly the ethoxyates and/or propoxyates, of saturated or mono- to polyunsaturated linear or branched alcohols containing 10 to 22 carbon atoms and preferably 12 to 18 carbon atoms. The degree of alkoxylation of the alcohols is generally between 1 and 20 and preferably between 3 and 10. They may be produced in known manner by reaction of the corresponding alcohols with the corresponding alkylene oxides. Fatty alcohol derivatives are particularly suitable, although branched-chain isomers thereof, more particularly so-called oxoalcohols, may also be used for the production of useful alkoxyates. Accordingly, the alkoxyates and, in particular, the ethoxyates of primary alcohols with linear radicals, more particularly dodecyl, tetradecyl, hexadecyl or octadecyl radicals, and mixtures thereof are suitable. Corresponding alkoxylation products of alkylamines, vicinal diols and carboxylic acid amides, which correspond to the alcohols mentioned in regard to the alkyl moiety, may also be used. Also suitable are the ethylene oxide and/or propylene oxide insertion products of fatty acid alkyl esters, and fatty acid polyhydroxyamides. Alkyl polyglycosides suitable for incorporation in the detergents according to the invention are compounds corresponding to the general formula $(G)_n-OR^{12}$, where R^{12} is an alkyl or alkenyl group containing 8 to 22 carbon atoms, G is a glucose unit and n is a number of 1 to 10. The glycoside component $(G)_n$ is an oligomer or polymer of naturally occurring aldose or ketose monomers, including in particular glucose, mannose, fructose, galactose, talose, gulose, altrose, allose, idose, ribose, arabinose, xylose and lyxose. The oligomers consisting of these glycosidically linked monomers are characterized not only by the type of sugars present in them, but also by the number of sugars present, the so-called degree of oligomerization. As an analytically determined quantity, the degree of oligomerization n is generally a broken number with a value of 1 to 10 and, in the case of the glycosides preferably used, below 1.5 and, more particularly, between 1.2 and 1.4. By virtue of its ready availability, glucose is the preferred monomer unit. The alkyl or alkenyl moiety R of the glycosides also preferably emanates from readily available derivatives of renewable raw materials, more particularly from fatty alcohols, although branched-chain isomers thereof, particularly so-called oxoalcohols, may also be used for the production of useful glycosides. Accordingly, primary alcohols containing linear octyl, decyl, dodecyl, tetradecyl, hexadecyl or octadecyl radicals and mixtures thereof are particularly suitable. Particularly preferred alkyl glycosides contain a cocofatty alkyl group, i.e. mixtures with – essentially – R^{12} = dodecyl and R^{12} = tetradecyl.

The compositions, preferably if they are solid, may, in addition to the chlorine bleach compound, comprise solid peroxygen-based bleaching agent if desired, in particular in amounts in the range of 0.1% by weight to 20% by weight and preferably in the range of 0.5 % by weight to 5 % by weight, and, optionally, bleach activator, in particular in amounts in the range of 0.1 % by weight to 5 % by weight and preferably in the range of 0.3 % by weight to 3 % by weight. Suitable peroxygen-based bleaching agents are preferably the peroxygen compounds generally used in detergents, for example percarboxylic acids such as perdodecanoic acid or phthaloylamino peroxypropionic acid, alkali perborates, which may be present as tetra- or monohydrates, alkali percarbonates, alkali perpyrophosphates, and alkali persulfates. If such peroxygen-based bleaching agents are intended to act as chlorine scavengers in step III), they are coated such that they will not lose an unacceptable amount of oxidizing power in step I). Bleach activators include the customarily used N- or O-acyl compounds, for example multiply acylated alkylenediamines, in particular tetraacetylenediamine, acylated glycolurils, in particular tetraacetylglycoluril, N-acylated hydantoins, hydrazides, triazoles, urazoles, diketopiperazines, sulfonyl amides, and cyanurates, in addition to carboxylic acid anhydrides, in particular phthalic anhydride, carboxylic acid esters, in particular sodium nonanoyl or isononanoyl phenol sulfonate, and acylated sugar derivatives, in particular pentaacetyl glucose, as well as cationic nitrile derivatives such as trimethylammonium acetonitrile salts. To avoid interaction with the peroxygen compounds during storage, and in order of them being present as part of the chlorine scavenger in Step III), if so desired, the bleach activators may be coated with casing substances and/or granulated in a known manner, wherein tetraacetylenediamine, granulated with the aid of carboxymethylcellulose and having average grain sizes of 0.01 mm to 0.8 mm, granulated 1,5-diacetyl-2,4-dioxohexahydro-1,3,5-triazine, and/or trialkylammonium acetonitrile prepared in particle form are particularly preferred. Other preferred compositions, however, contain no other bleaching agent than the solid chlorine bleach compound.

The detergents to the invention may comprise optical brighteners, in particular derivatives of diaminostilbene disulfonic acid or alkali metal salts thereof. Suitable optical brighteners are, for example, salts of 4,4'-bis-(2-anilino-4-morpholino-1,3,5-triazinyl-6-)stilbene-2,2'-disulfonic acid or compounds of similar structure which contain a diethanolamino group, a methylamino group, an anilino group or a 2-methoxyethylamino group instead of the morpholino group. Optical brighteners of the substituted diphenylstyryl type may also be present, for example the alkali metal salts of 4,4'-bis(2-sulfoxyphenyl)diphenyl, 4,4'-bis(4-chloro-3-sulfoxyphenyl)diphenyl or 4-(4-chlorostyryl)-4'-(2-sulfoxyphenyl)diphenyl. Mixtures of the above-mentioned optical brighteners may also be used. In one embodiment, the detergent composition comprises up to 1% by weight, more specifically from 0.1% by weight to 0.99% by weight, of optical brightener.

Hueing dye may be included in the detergent composition in an amount sufficient to provide a tinting effect to fabric washed in a solution containing the detergent. In one embodiment, the

detergent composition comprises from 0.00001% by weight to 0.001% by weight, more specifically from 0.00003% by weight to 0.0001% by weight, of hueing dye. Exemplary dyes which exhibit hueing properties are the triarylmethane blue and violet basic dyes Basic Blue 1, Basic Blue 5, Basic Blue 7, Basic Blue 8, Basic Blue 11, Basic Blue 15, Basic Blue 18, Basic Blue 20, Basic Blue 23, Basic Blue 26, Basic Blue 55, Basic Blue 81, Basic Violet 1, Basic Violet 2, Basic Violet 3, Basic Violet 4, Basic Violet 14, and Basic Violet 23, the methine blue and violet basic dyes Basic Violet 7, Basic Violet 16, and Basic Violet 21, the anthraquinone dyes Basic Blue 21, Basic Blue 22, Basic Blue 47, Basic Blue 35, and Basic Blue 80, the azo dyes Basic Blue 16, Basic Blue 65, Basic Blue 66, Basic Blue 67, Basic Blue 71, Basic Blue 159, Basic Violet 19, Basic Violet 35, Basic Violet 38, and Basic Violet 48, the oxazine dyes Basic Blue 3, Basic Blue 75, Basic Blue 95, Basic Blue 122, Basic Blue 124, Basic Blue 141, Nile Blue A, the xanthene dye Basic Violet 10, and mixtures thereof.

The manufacture of detergents to be used in the process according to the invention poses no difficulty and in principle can be achieved by known methods, for example by mixing, by spray drying or by granulation, wherein the bleaching agent may optionally be added later or may take part in a granulation process. For manufacturing detergents with an increased bulk density, particularly in the range of 650 g/l to 950 g/l, a preferred process is one with an extrusion step.

After contact times normally in the range of from 1 min to 12 min, preferably from 1 min to 3 min in step I), the white and/or colour-stable coloured textiles are removed from the wash liquor (step II)) and may be rinsed with water, dried, and ironed, as is customary.

After removal of the textiles, an amount of chlorine scavenger sufficient for removing, preferably by reducing or by oxidizing, the remaining chlorine bleach compound so that it will not detrimentally act on the coloured textiles in step IV) is added. Usable as chlorine scavengers are for example compounds capable of oxidizing Cl, preferably the peroxygen-based bleaching agents mentioned above, if so desired in combination with bleach activators also mentioned above, and compounds capable of reducing chlorine, preferably selected from the group encompassing alkali sulfites, alkali hydrogensulfites, alkali thiosulfates, alkali dithionites, and mixtures thereof. Preferably chlorine scavenger is added in amounts in the range of from 0.01 g to 0.1 g, preferably from 0.02 g to 0.2 g to 1 liter of wash liquor. It reacts with the chlorine bleach compound present in the wash liquor and thereby removes the danger of damaging the colour of the subsequently added colour-unstable coloured textiles. Step III) may be performed by actually putting the chlorine scavenger or a detergent comprising chlorine scavenger into the vessel containing the wash liquor as an additional component. It is also possible to introduce the chlorine scavenger in step III) by setting it free out of a form that was already present during step I), for example as part of a detergent used in that step. Suitably forms may be chlorine scavengers coated and/or granulated so that they will not dissolve

during step I), but after step III). A further subject of the invention therefore is a detergent comprising both chlorine bleach compound and chlorine scavenger, the chlorine scavenger being set free after the chlorine bleach compound is set free when the detergent is contacted with water. Preferably the time between setting free said different components corresponds to the time given above for the duration of step I) of the process according to the invention. The separately controlled release of said different components may for example be achieved by introducing a dual or multiple chamber unit dose detergent, which comprises chlorine bleach compound and chlorine scavenger in separate chambers, in or prior to step I) into the wash liquor, such that the chamber comprising the chlorine bleach compound will set free the chlorine bleach compound prior to and/or in step I), and the second chamber comprising the chlorine scavenger will set free the chlorine scavenger in step III). This may be achieved for example by using a dual or multi chamber pouch made of differently soluble films, the film forming the chamber or part of the chamber comprising the chlorine bleach compound being thinner, less hydrophobic, and/or made of polymeric material which is less cross-linked than the film forming the chamber comprising the chlorine scavenger. It is also possible to impregnate sheets with the chlorine scavenger or a detergent comprising the chlorine scavenger and to add such sheets to the wash liquor in step III). As well it is possible to impregnate separate regions of a sheet with chlorine bleach compound or a detergent comprising chlorine bleach compound and chlorine scavenger or a detergent comprising the chlorine scavenger; such sheets may be introduced into the wash liquor prior to or in step I), if the solubility of the separately impregnated compositions is such that the chlorine bleach compound will be set free prior to and/or in step I), and the chlorine scavenger will be set free after step II). This may be achieved for example by coating the region or regions comprising the chlorine scavenger with a coating that is less water soluble than the coating used to coat the region or regions comprising the chlorine bleach compound.

For the process according to the invention and in the detergent according to the invention, it is preferable to combine the chlorine scavenger with a coloured substance, so that the chlorine scavenger and the colored substance are both set free at the same time or at least both are set free after step I); in this way the user will get a visible information when it is safe to add the colour-unstable coloured textiles to the wash liquor. The coloured substance combined with the chlorine scavenger should have no or no unacceptable affinity to the textiles added in step IV).

If the chlorine scavenger is added to the wash liquor as part of a detergent in step III), such detergent may, apart from the chlorine bleach compound, comprise ingredients mentioned above for a detergent to be added in or prior to step I). If a detergent comprises both chlorine bleach compound and chlorine scavenger, it preferably comprises chlorine bleach compound and chlorine scavenger in molar ratios in the range of from 1:1 to 1:10, more preferably from 1:1.1 to 1:5, especially at approximately 1:4.

After contact times normally in the range of from 1 min to 12 min, preferably from 1 min to 3 min in step IV), the colour-unstable coloured textiles are removed from the wash liquor and may be rinsed with water, dried, and ironed, as is customary. The wash liquor may then be discarded.

Examples

A solid detergent with chlorine bleach compound and chlorine scavenger was prepared by mixing the ingredients given in the following table in the amounts (% by weight) also given there

C ₁₂₋₁₈ -Fatty alcohol with 7 EO	2
Na-salt of C ₁₂₋₁₈ -Fatty alcohol sulfate with 7 EO	1,5
Na-salt of alkylbenzene sulfonate	15
Sodium carbonate	20
Sodium hydrogencarbonate	6,5
Sodium disilicate	4
Sodium dichloro isocyanurate	2
Polyacrylate (sodium salt)	3
Carboxymethylcellulose	1
Tetrasodium 1-hydroxyethane-1,1-diphosphonate	1
Sodium sulfate	26,7
Sodium Thiosulfate Pentahydrate, coated	2
Perfume	0,3
Water	Add 100

Claims

1. Process for washing textiles in an aqueous wash liquor, comprising the following steps:
I) white and/or colour-stable coloured textiles in need of cleaning are contacted with an aqueous wash liquor that comprises chlorine bleach,
II) the textiles are removed from said wash liquor,
III) a chlorine scavenger is added to said wash liquor, and
IV) colour-unstable coloured textiles in need of cleaning are contacted with said wash liquor.
2. Process according to claim 1, characterized in that the aqueous wash liquor that comprises chlorine bleach for step I) is prepared from liquid or solid chlorine bleach compounds and preferably comprises additional ingredients commonly used in the washing of clothes.
3. Process according to claim 2, characterized in the solid chlorine bleach compound is selected from the group consisting of dichloroisocyanuric acid, alkali metal dichloroisocyanurates, which may be anhydrous or can be used in the form of its mono- and/or dihydrates, 1,3,5-trichloroisocyanuric acid, alkali metal 1,3,5-trichloroisocyanurates, N-Chloro-sulfonamides, such as alkali metal N-chloro-(4-methyl-benzene)-sulfonamide (Chloramin® T), Calcium oxychloride, which can also be used as its mixed salt with calcium chloride and calcium hydroxide, such as $3 \text{ CaCl}(\text{OCl}) \cdot \text{Ca}(\text{OH})_2 \cdot 5 \text{ H}_2\text{O}$, and its mixtures, or the liquid chlorine bleach compound is an aqueous solution of alkali hypochlorite.
4. Process according to any of claims 1 to 3, characterized in that the wash liquor of step I) comprises amounts of chlorine bleach, calculated as Cl (active chlorine), in the range of from 0.1 g/l to 10 g/l, preferably from 0.5 g/l to 2.5 g/l.
5. Process according to any of claims 1 to 3, characterized in that after contact times in the range of from 1 min to 12 min, preferably from 1 min to 3 min in step I), the white and/or colour-stable coloured textiles are removed from the wash liquor.
6. Process according to any of claims 1 to 5, characterized in that the chlorine scavengers in step III) are compounds capable of oxidizing Cl, preferably peroxygen-based bleaching agents, if so desired in combination with bleach activators, or compounds capable of reducing chlorine, preferably selected from the group encompassing alkali sulfites, alkali hydrogensulfites, alkali thiosulfates, alkali dithionites, and mixtures thereof.

7. Process according to any of claims 1 to 6, characterized in that chlorine scavenger is added in amounts in the range of from 0.01 g to 0.1 g, preferably from 0.05 g to 0.2 g to 1 liter of wash liquor.
8. Process according to any of claims 1 to 7, characterized in that after contact times in the range of from 1 min to 12 min, preferably from 1 min to 3 min in step IV), the colour-unstable coloured textiles are removed from the wash liquor.
9. Detergent comprising both chlorine bleach compound and chlorine scavenger, the chlorine scavenger being set free after the chlorine bleach compound is set free when the detergent is contacted with water.
10. Detergent according claim 9, characterized in that it comprises chlorine bleach compound and chlorine scavenger in molar ratios in the range of from 1:1 to 1:10, preferably from 1:1.1 to 1:5.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/079987

A. CLASSIFICATION OF SUBJECT MATTER		
INV. C11D3/00	C11D3/39	C11D3/395 C11D11/00 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) 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		
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X	EP 0 286 773 A2 (ECOLAB INC [US]) 19 October 1988 (1988-10-19) column 3, line 1 - column 4, line 11 column 6, line 7 - line 54 column 7, line 9 - line 30 column 11, line 29 - column 13, line 7 claims 10-13 ----- -/--	9,10
☒ 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 "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "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 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 7 February 2017		Date of mailing of the international search report 17/02/2017
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 Cetinkaya, Murat

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