(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 190 964 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
09.11.2011 Bulletin 2011/45

(21) Application number: **08786958.2**

(22) Date of filing: **06.08.2008**

(51) Int Cl.:
C11D 3/33 *(2006.01)* ***C11D 3/36*** *(2006.01)*
C11D 3/20 *(2006.01)* ***C11D 1/22*** *(2006.01)*
C11D 11/00 *(2006.01)* ***C11D 3/42*** *(2006.01)*
C11D 3/40 *(2006.01)* ***C11D 3/30*** *(2006.01)*
C11D 3/37 *(2006.01)*

(86) International application number:
PCT/EP2008/060352

(87) International publication number:
WO 2009/040175 (02.04.2009 Gazette 2009/14)

(54) **IMPROVEMENTS RELATING TO FABRIC TREATMENT COMPOSITIONS COMPRISING SEQUESTRANTS AND DISPERSANTS**

VERBESSERUNGEN BETREFFEND TEXTILBEHANDLUNGSZUSAMMENSETZUNGEN MIT SEQUESTRIER- UND DISPERGIERMITTELN

AMÉLIORATIONS RELATIVES À DES COMPOSITIONS DE TRAITEMENT DES TISSUS COMPRENANT DES SÉQUESTRANTS ET DES DISPERSANTS

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR

(30) Priority: **24.09.2007 EP 07117028**

(43) Date of publication of application:
02.06.2010 Bulletin 2010/22

(73) Proprietors:
- **Unilever PLC, A Company Registered in England and Wales under Company no. 41424 London EC4Y 0DY (GB)**
  Designated Contracting States:
  CY GB IE MT
- **Unilever N.V. 3013 AL Rotterdam (NL)**
  Designated Contracting States:
  AT BE BG CH CZ DE DK EE ES FI FR GR HR HU IS IT LI LT LU LV MC NL NO PL PT RO SE SI SK TR

(72) Inventor: **PARKER, Andrew, Philip**
Wirral Merseyside CH63 3JW (GB)

(74) Representative: **McHugh, Paul Edward**
Unilever
Patent Group
Unilever Colworth
Sharnbrook
Bedford
MK44 1LQ (GB)

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Description

FIELD OF THE INVENTION

[0001] The invention relates to a method of conferring an improved whiteness benefit to white textile articles during fabric laundering.

BACKGROUND OF THE INVENTION

[0002] Consumers are aware that white textile articles lose their apparent whiteness over repeated wash and wear cycles. This is undesirable as whiteness is also usually linked in the consumer's minds to the cleanliness of the laundered garment. This perceived loss of whiteness can occur from, for example, damage to the textile fibres or incomplete soil removal; it may also occur due to the deposition of insoluble coloured metal complexes onto the white textile article, or to the deactivation of the fluorescent whitening agent (FWA).

[0003] Many laundry detergents, for example those that contain bleach, rely on a fluorescent whitening agent (FWA) to impart whiteness and brightness to white textiles. These materials absorb ultra-violet light and re-emit the light in the blue region of the visible spectrum. The blue colour counters the natural yellow colour of cotton. This enhanced blueness is perceived by the consumer as whiteness. A similar effect may be obtained by using low levels of blue or violet dyes (shading dyes). WO 9927059 describes a method for washing white textile articles whereby FWA is added separately from the main quantity of washing substances.

[0004] The effectiveness of these fluorescent whitening agents is dependent on the amount of UV light and the quantum yield (a measure of the efficiency of the UV to visible light conversion process). Thus, a reduction in available UV light or a reduction in the quantum yield will be seen as a reduction in whiteness.

[0005] It is therefore desirable to confer an improved whiteness benefit to white textile articles during the laundering process.

BRIEF DESCRIPTION OF THE INVENTION

[0006] We have now found that the addition of a composition comprising a transition metal cation sequestrant and a dispersant to a wash step and at least one rinse step of the laundering process confers an improved whiteness benefit to white textile articles.

[0007] The present invention therefore provides in a first aspect, a method of conferring an improved whiteness benefit to a white textile article during a laundry process, comprising the steps of:

a) provision of an aqueous liquor comprising a laundry treatment composition which comprises a fluorescent whitening agent and an active agent, and,
b) contacting the white textile article with the aqueous liquor of a); characterised in that the active agent comprises:

i) a transition metal cation sequestrant; and,
ii) a dispersant which comprises one or more of naphthalene sulphonate-formaldehyde condensates, acrylic polymers, sulphonated styrene/maleic anhydride copolymers or a mixture thereof; and, that the white textile article is first contacted with the laundry treatment composition comprising the active agent during a wash step, and is further contacted with active agent made available from a different and separate rinse-added laundry treatment composition.

[0008] By ensuring that there is contact with fabric during a wash and at least one rinse step of the laundry process, an unexpectedly high whiteness benefit is obtained. As this method involves subsequent contact of the article with further active agent delivered from a different and separate rinse-added laundry treatment composition, the method does not require any reliance on ensuring adequate and selective carry-over of already dissolved materials from the wash to the rinse.

[0009] The method to improve whiteness involves contact of the white textile article with further active agent. This occurs from providing additional composition comprising the active agent (either in a similar product format or different product format) to subsequent steps of the laundry process.

DETAILED DESCRIPTION OF THE INVENTION

[0010] The 'active agent' described herein refers to an agent comprising two parts, the transition metal cation sequestrant and dispersant.

[0011] The white textile article is contacted with further active agent during the laundry process. This may suitably

happen in various ways.

[0012] In one embodiment, contact with further active agent may suitably happen by addition of a second portion of active agent to a subsequent laundry step, i.e. the active added to the main wash and to one or more rinse steps.

[0013] In an example of the aforementioned embodiment, preferably the laundry treatment composition comprises an anionic or nonionic detersive surfactant, where the further active agent is incorporated in a different and separate rinse-added laundry treatment composition. Preferably the rinse-added laundry treatment composition comprises a quaternary ammonium compound.

[0014] In the method of the invention, the aqueous liquor of a) is an aqueous main wash liquor, and contact with further active agent occurs during a rinse step of the wash process. More preferably, contact with further active agent occurs during the final rinse step of the wash process. Even more preferably, contact with further active agent occurs during all rinse steps of the wash process.

[0015] Preferably the transition metal cation sequestrant is able to bind Cu" and/or Fe".

[0016] Preferably, the sequestrant has a binding capacity (log k) for copper(II) and iron(II) of greater than 8. Non-limiting examples include tetrasodium etidronate, ethylenediamine tetraacetic acid (EDTA), iminodisuccinic acid sodium salt (IDS), ethylene diamine disuccinic acid trisodium salt (EDDS), *N,N,N',N'*-tetrakis (2-hydoxypropyl) ethylene diamine (TPED), gluconic acid sodium salt, nitrilotriacetic acid sodium salt monohydrate (NTA), (1-hydroxy ethylidene) diphosphonic acid potassium salt.

[0017] Examples of commercially available suitable sequestrants are IDS, for example Baypure™ CX (ex. Bayer), and Turpinal™ 4NP (ex. Solutia).

[0018] Examples of suitable dispersants include naphthalene sulphonate-formaldehyde condensates, acrylic polymers, and sulphonated styrene/maleic anhydride copolymers.

[0019] An example of a commercially available dispersant is Suparex™ KS (ex. Clariant)

[0020] Preferably the laundry composition used in the method of treatment comprises a fluorescent whitening agent. Alternatively it may comprise a blue or violet dye instead of, or additionally to the fluorescent whitening agent.

[0021] Examples of fluorescent whitening agents can be found in "Formulating Detergents and Personal Care Products", Louis Ho Tan Tai, published in 2000 by AOCS Press, at pages 125-128. The fluorescent whitening agent is typically present in detergent formulations at a level of 0.1 wt.% on weight of total formulation.

[0022] The sequestrant and dispersant present in the method according to the invention are present in the aqueous liquor at a level of from 0.001 g/L to 1.0g/L, preferably from 0.0015g/L to 0.5g/L, to each required stage of the wash process.

[0023] Extended release for a main wash composition means that release of the active agent (the sequestrant and dispersant) occurs at least in part after the main wash of a laundry process. An example is a composition which releases active species across the wash, i.e. active species are released during the main wash and at least the first rinse step. Preferably the delayed release composition will release active species across the main wash and all subsequent rinse steps.

[0024] An improved whiteness benefit as used herein is defined as either enhancing the whiteness of the textile article, or otherwise preserving the perceived whiteness of the textile article from damage by the washing process.

[0025] The white textile article is defined as a textile article which comprises substantial white areas; preferably, it is a solely white textile article. Preferably the textile article is cotton or cotton rich.

[0026] Preferably the article comprises at least 50% cotton fibres by weight.

[0027] As outlined above, the present invention is based on the surprising finding that ensuring the extended presence of a transition metal cation sequestrant and dispersant that can bind or prevent aggregation of metal species, in certain stages of a domestic wash cycle (i.e. both the main wash and at least one of the rinse stages) produces an unexpectedly large whiteness benefit when compared to addition of the active agent in just the main wash.

The Laundry Process

[0028] The method of the invention is applied to a white textile article, preferably a non-keratinaceous textile article, more preferably a cellulosic or cellulose containing textile article.

[0029] The laundry process to which the method of the present invention applies can be any laundry process comprising a wash and a rinse step. The process may be manual, such as hand-washing or, more preferably, semi-automatic or automatic such as performed by an automatic washing machine.

[0030] The laundry process comprises at least one main wash step and a final rinse step. Typically, there will be more than one rinse step. Thus a laundry process according to the present invention preferably comprises a main wash step, at least one, preferably two, most preferably three or more intermediate rinse steps and a final rinse step.

[0031] The laundry process is preferably facilitated by an automatic washing machine. Such a laundry process typically comprises at least one main wash step, in which textile articles are contacted with the or each main wash liquor. This liquor comprises an aqueous solution or dispersion of a main wash detergent product.

[0032] At the end of the main wash, the main wash liquor is usually drained from the machine and one or more rinses

takes place. Typically a series of sequential rinses takes place, culminating in a final rinse.

[0033] As used herein, the term "rinse liquor" refers to the rinse water. Each rinse is usually drained from the machine before the next rinse is applied, although alternative processes are known whereby the first rinse can be added to the machine without draining the wash liquor - draining and subsequent rinses can then follow. As used herein, the term "intermediate rinse" means a rinse which is not the final rinse of the laundry process and the term "final rinse" means the last rinse in the series of rinses.

[0034] In a typical automatic washing machine laundry process, a composition comprising a benefit agent, such as a rinse conditioner, is added to the final rinse only.

[0035] In the method of the present invention the active agent is preferably present both in the main wash and preferably throughout the rinses, or in at least in one (preferably the first) of the rinses. The present invention is not concerned with those instances where the active agent is present only in the main wash, or is only present in the final rinse.

[0036] Employing both a rinse conditioner comprising the active agent and a main wash detergent comprising the active agent will ensure that the active agent is present in the main wash and the final rinse. This will have some benefit, but during the intermediate rinses the active agent will be removed unless supplemented.

[0037] Thus preferably, an extended release composition is used in the main wash in the method of the invention.

[0038] Preferably the active agent is entrapped, preferably encapsulated in an extended release matrix.

[0039] In one preferred embodiment, the active agent is added by means of a dispensing device containing said active agent entrapped in a 'slow-release' formulation. The slow release formulation preferably comprises a carrier material for the active agent. Preferably the carrier material is at best sparingly soluble in the wash or rinse liquor.

[0040] The extended release matrix may be any material which is capable of providing extended release of an active agent over an extended period of time.

[0041] Preferably, the further active agent is added from a composition which slowly releases the active agent, but is large enough to be retained between wash/rinse steps of the laundry process.

[0042] The active agent can be suitably delivered by encapsulation in an extended release granule of a sufficient size (between 3μm and 10mm) that it is retained in the drum during the wash and rinse steps of the laundry process. Preferably, the further active agent is added from a composition which slowly releases the active agent, but is large enough to be retained between wash/rinse steps of the laundry process.

[0043] The active agent may also be delivered in an extended release matrix used for multiple laundry processes (i.e. used for multiple wash/rinse cycles); it may alternatively be delivered by an automatic dosing system whereby the required amount is automatically added to each laundry process, or to each wash or rinse step of the laundry process.

[0044] For the matrix material, a polyalkylene glycol, preferably poly[ethylene glycol] (PEG), based carrier material is used in a preferred embodiment of the invention. The amount of the active agent within the PEG carrier is such that the concentration of transition metal sequestrant and dispersant present in the wash liquor or rinse liquor is from 0.001 g/L to 1.0g/L, preferably from 0.0015g/L to 0.5g/L.

[0045] One preferred dispensing device is a dispensing ball or 'shuttle', more preferably a dual or multi compartment dispensing device. The dual or multi-compartment dispensing device comprises the active agent entrapped on a carrier material with one or more separate compartments available for the incorporation of a solid or liquid detergent in a separate compartment of the device to the extended release active agent formulation.

[0046] The dispensing device can be tailored for a single use, i.e. for a single wash with one or more rinse cycles.

[0047] Alternatively, the dispensing device can be tailored for use on multiple occasions, i.e. numerous wash and rinse cycles. In this case, the dispensing device will preferably take the product form of an extended release dispensing device present in the main wash drum, tray or sump of the washing machine.

[0048] It is also envisaged that the present invention may be put into effect by means of a so-called "smart shuttle". In such a device, which may include means for measuring parameters of the liquor, release of materials occurs when predetermined conditions are met. A device of this general description is disclosed in US 2004/0088796.

The Aqueous Liquor

[0049] In the method of the invention, the aqueous composition (be it the main wash liquor, or a rinse liquor) comprises the active agent.

[0050] In the method of the invention, the textile is contacted with the aqueous composition comprising the active agent in the main wash and further active agent is made available during a subsequent rinse step of the laundry process for contact with the white textile articles.

Mode of Addition

[0051] The active agent may be simply the transition metal cation sequestrant and dispersant, or it may, in addition, comprise other beneficial components.

[0052] During the method of the invention, the active agent is comprised in an aqueous composition as described above. This aqueous composition comprising the active agent is prepared by the dissolution or dispersion of the active agent in the wash or rinse liquor. Prior to said dissolution/dispersion, the active agent may exist in any suitable form.

[0053] Preferred formats are that the active agent is:

a) included in a composition, for example a laundry detergent or rinse conditioner composition, which may be a powder, liquid, gel or tablet composition;
b) encapsulated in a capsule or capsules, immobilised in a suitable carrier or matrix, for example in a slow release formulation;
c) held on a support; or,
d) simply used as the neat compound itself, with or without other components.

[0054] Any combination of these forms may be used to provide the active agents at different stages in the wash process.

[0055] In one simple format, the active agent and further active agent can be added to the wash or rinse liquor manually, for example during hand washing or a semi-automatic washing process. Examples of manual addition include using a scoop or a jug to add a measured quantity of the active agent directly into the wash or into one or more rinse liquors. The scoop or jug may be calibrated.

[0056] The active agent may be added to the wash or rinse liquor by means of automatic dosing by a washing machine with automatic dosing functionality. Ideally, addition should be to every wash stage including the, or each, main wash and all the rinses. This may be accomplished by modification of the washing machine design such that the machine comprises specific dispensing means to ensure that materials are added to the water being supplied into the washing drum. However, as washing machines are supposed to last for a number of years it is preferable to provide means to ensure that the present invention can be put into effect with an existing washing machine.

[0057] The active agent, in whichever form, may be contained in a dispensing device. The dispensing device may be suitable for use in the drum or the drawer of a washing machine. It may be attached to the interior of the drum, or the sump of the washing machine, or attached to the water inlet so as to come into contact with the water for the wash or rinse liquor before the water enters the washing machine. This may either be used for a single or a plurality of washes and in either case may be consumed entirely (such as a tablet or granular composition) or partially (such as a 'shuttle'). In the case of a dispensing device attached to the water inlet of the machine it is convenient that the device can be bypassed if the user wishes to employ a bleaching composition although this is not strictly necessary if a sufficient excess of bleach is present.

[0058] Contact with the further active agent means that the concentration of active agent in the aqueous composition is replenished or increased during the laundry process or is kept substantially constant throughout the process. The replenishment typically occurs when fresh water is taken into the washing process and comes into contact with the source of active agent thus causing dissolution of a quantity of the agent into the water. Thus the active agent can have extended release into the liquor through all or part of the laundry process. The present invention does not rely on carry-over of already dissolved transition metal sequestrant or dispersant from the wash into subsequent stages of the laundry process.

[0059] Contact with the further active agent means that a separate rinse-added composition comprising the mild reducing agent is added to a rinse step and contacted with the fabric.

[0060] During use in an automatic washing machine, the active agent may be immobilised in a slow release matrix, immobilised in a slow release matrix, dissolution and/or dispersion into the liquor takes place when the water for a main wash or rinse is taken in by the machine and contacts the immobilised formulation.

[0061] By extended release is meant a means by which addition of the active agent to the wash or rinse liquor is allowed to progress in portions over time. This can be through an automatic dosing device either as part of the washing machine, or exterior to the washing machine. Preferably the means for extended release is through a device which allows for constant contact between the wash or rinse liquor and the extended release device. More preferred is a device which allows constant contact between a constant available surface-area of the active agent immobilised on a carrier material.

[0062] This ensures that under the same conditions, the same amount of active agent can be dispensed each time. A person skilled in the art will know that the main wash liquor and rinse liquor will have different properties (temperature of the liquor, presence of additional chemicals in the wash liquor (depending on the detergent product used), different volumes of water), and so the amount of active agent so dispensed will differ between a main wash and a rinse step. Nevertheless, the preferred embodiment of the product is formulated so that the active agent is dispensed from the slow release formulation in an amount such that the concentration of transition metal cation sequestrant and dispersant are independently maintained at a level of from 0.001g/l to 1.0g/l preferably from 0.0015g/l to 0.5g/l.

Composition Form

[0063] Laundry treatment composition is herein described to include main wash and rinse products. Preferably the laundry treatment compositions are a main wash laundry detergent composition and a rinse composition, for example rinse conditioners.

[0064] If the laundry treatment composition is to be used in the main wash cycle, i.e. as a laundry detergent composition, then it may take the form of an isotropic liquid, a surfactant-structured liquid, a granular, spray-dried or dry-blended powder, a tablet, a paste, a molded solid or any other laundry detergent form known to those skilled in the art. In such cases, the laundry treatment composition will comprise one or more detersive surfactants.

[0065] Alternatively, the laundry treatment composition may take the form of a rinse added product, for example, a rinse conditioner.

Textile Compatible Carrier

[0066] In the context of the present invention the term "textile compatible carrier" includes a component which can assist in the interaction of the cellulose cross-liking agent with a textile. The main wash or rinse compositions suitable for use in the method of the present invention preferably comprise one or more textile compatible carriers.

Detersive Surfactants

[0067] Preferably, the carrier is selected from a detersive surfactant or a rinse conditioner compound.

[0068] If the textile compatible carrier is a detersive surfactant, then preferably it is selected from anionic, nonionic, cationic, zwitterionic or amphoteric detersive surfactants.

[0069] The composition comprises between 2 to 70 wt% of a detersive surfactant, most preferably 10 to 30 wt%. The detersive surfactant may be chosen from the surfactants described "Surface Active Agents" Vol. 1, by Schwartz & Perry, Interscience 1949, Vol. 2 by Schwartz, Perry & Berch, Interscience 1958, in the current edition of "McCutcheon's Emulsifiers and Detergents" published by Manufacturing Confectioners Company or in "Tenside-Taschenbuch", H. Stache, 2nd Edn., Carl Hauser Verlag, 1981. Preferably the surfactants used are saturated.

[0070] Suitable nonionic detergent compounds which may be used include, in particular, the reaction products of compounds having a hydrophobic group and a reactive hydrogen atom, for example, aliphatic alcohols, acids, amides or alkyl phenols with alkylene oxides, especially ethylene oxide either alone or with propylene oxide. Specific nonionic detergent compounds are C_6 to C_{22} alkyl phenol-ethylene oxide condensates, generally 5 to 25 EO, i.e. 5 to 25 units of ethylene oxide per molecule, and the condensation products of aliphatic C_8 to C_{18} primary or secondary linear or branched alcohols with ethylene oxide, generally 5 to 40 EO.

[0071] Suitable anionic detergent compounds which may be used are usually watersoluble alkali metal salts of organic sulphates and sulphonates having alkyl radicals containing from about 8 to about 22 carbon atoms, the term alkyl being used to include the alkyl portion of higher acyl radicals. Examples of suitable synthetic anionic detergent compounds are sodium and potassium alkyl sulphates, especially those obtained by sulphating higher C_8 to C_{18} alcohols, produced for example from tallow or coconut oil, sodium and potassium alkyl C_9 to C_{20} benzene sulphonates, particularly sodium linear secondary alkyl C_{10} to C_{15} benzene sulphonates; and sodium alkyl glyceryl ether sulphates, especially those ethers of the higher alcohols derived from tallow or coconut oil and synthetic alcohols derived from petroleum. The preferred anionic detergent compounds are sodium C_{11} to C_{15} alkyl benzene sulphonates and sodium C_{12} to C_{18} alkyl sulphates. Also applicable are surfactants such as those described in EP-A-328 177 (Unilever), which show resistance to salting-out, the alkyl polyglycoside surfactants described in EP-A-070 074, and alkyl monoglycosides.

[0072] Suitable amphoteric surfactants are amine oxides or betaines.

[0073] Preferred surfactant systems are mixtures of anionic with nonionic detergent active materials, in particular the groups and examples of anionic and nonionic surfactants pointed out in EP-A-346 995 (Unilever). Especially preferred is surfactant system that is a mixture of an alkali metal salt of a C_{16} to C_{18} primary alcohol sulphate together with a C_{12} to C_{15} primary alcohol 3 to 7 EO ethoxylate.

[0074] The nonionic detergent is preferably present in amounts greater than 10%, e.g. 25 to 90 wt% of the surfactant system. Anionic surfactants can be present, for example, in amounts in the range from about 5% to about 40 wt% of the surfactant system.

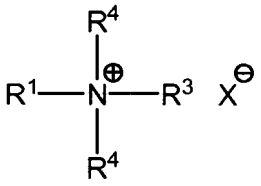
Rinse Conditioners

[0075] If the textile compatible carrier is a rinse conditioner compound, then preferably the textile compatible carrier is a cationic compound.

[0076] Preferred cationic compounds are quaternary ammonium compounds.

[0077] It is advantageous if the quaternary ammonium compound is a quaternary ammonium compound having at least one C_{12} to C_{22} alkyl chain.

[0078] It is preferred if the quaternary ammonium compound has the following formula:



in which R^1 is a C_{12} to C_{22} alkyl or alkenyl chain; R^2, R^3 and R^4 are independently selected from C_1 to C_4 alkyl chains and X^- is a compatible anion. A preferred compound of this type is the quaternary ammonium compound cetyl trimethyl quaternary ammonium bromide.

[0079] A second class of materials for use with the present invention are the quaternary ammonium of the above structure in which R^1 and R^2 are independently selected from C_{12} to C_{22} alkyl or alkenyl chain; R^3 and R^4 are independently selected from C_1 to C_4 alkyl chains and X- is a compatible anion.

[0080] Other suitable quaternary ammonium compounds are disclosed in EP 0 239 910 (Proctor and Gamble).

[0081] The cationic compound may be present from 1.5 wt% to 50 wt% of the total weight of the composition. Preferably the cationic compound may be present from 2 wt% to 25 wt%, a more preferred composition range is from 5 wt% to 20 wt%.

[0082] Compositions suitable for delivery during the rinse cycle may also be delivered to the textile in the tumble dryer if used in a suitable form. Thus, another product form is a composition (for example, a paste) suitable for coating onto, and delivery from, a substrate e.g. a flexible sheet or sponge or a suitable dispenser during a tumble dryer cycle.

Builders or Complexing Agents

[0083] The composition may comprise one or more builders. Such materials may suitably be aluminosilicates, silicates, carbonates, citrates, polycarboxylates, complexing agents, and phosphates.

[0084] Where builder is present, the compositions may suitably contain from 10 to 70 wt.% of detergency builder. Preferably the total level of builder is less than 20 wt.%.

[0085] Examples of suitable zeolites are: zeolite A, zeolite B (also known as zeolite P), zeolite C, zeolite X, zeolite Y and also the zeolite P-type as described in EP-A-0,384,070.

[0086] The composition may also comprise a complexing agent such as: ethylenediaminetetraacetic acid, diethylen-etriamine-pentaacetic acid, alkyl- or alkenylsuccinic acid, nitrilotriacetic acid, or, mixtures thereof.

[0087] Alternatively, or additionally to the aluminosilicate builders, phosphate builders may be used. In this art the term 'phosphate' embraces diphosphate, triphosphate, and phosphonate species. Other forms of builder include silicates, such as soluble silicates, metasilicates, layered silicates (e.g. SKS-6 from Hoechst).

[0088] For low cost formulations carbonate (including bicarbonate and sesquicarbonate) and/or citrate may be employed as builders.

Polymers

[0089] The composition may comprise one or more polymers. Examples are: carboxymethylcellulose, poly(ethylene glycol), poly(vinyl alcohol), poly(vinylpyridine-N-oxide), polycarboxylates (such as polyacrylates, maleic/ acrylic acid copolymers and lauryl methacrylate/acrylic acid copolymers), and mixtures thereof. The composition may additionally comprise soil release polymers such as block copolymers of polyethylene oxide and terephthalate.

[0090] The composition may additionally comprise a dye transfer inhibition agent. These prevent migration of dyes, especially during long soak times. Such agents are preferably selected from polyvinylpyrridine N-oxide (PVNO), polyvinyl pyrrolidone (PVP), polyvinyl imidazole, N-vinylpyrrolidone and N-vinylimidazole copolymers (PVPVI), and copolymers thereof, and/or mixtures thereof.

[0091] The amount of dye transfer inhibition agent if present, in the composition will be from 0.01 to 10 %, preferably from 0.02 to 5 %, more preferably from 0.03 to 2 %, by weight of the composition.

Enzymes

[0092] Additional colour benefits can be obtained by the incorporation of enzymes. Enzymes contemplated for use in laundry detergent compositions include proteases, alpha-amylases, cellulases, lipases, peroxidases/oxidases, pectate

lyases, mannanases, or mixtures thereof.

Optional Colour Care Benefit Agents

[0093] The compositions of the invention may also contain optional colour care benefit agents. Preferred colour care benefit agents are polysaccharides. Typically, the wash/rinse liquor will comprise around 0.01 g/L of a polysaccharide colour care benefit agent.

[0094] Preferably the polysaccharide is a beta 1-4 polysaccharide; more preferably a cellulose derivative, such as a hydroxy C2-C4 alkyl derivative. More preferably the hydroxy C2-C4 alkyl derivative is a hydroxy ethyl derivative.

[0095] Preferably the degree of substitution (DS) of the polysaccharide is 1.5-2.25. Preferably the molecular weight of the polysaccharide is 100,000 to 500,000 Dalton.

Other Detergent Ingredients

[0096] The composition may also contain other conventional detergent ingredients such as e.g. fabric conditioners including clays or silicones, foam boosters, anti-corrosion agents, soil-suspending agents, anti-soil redeposition agents, dyes, antimicrobials, stabilisers, tarnish inhibitors, or perfumes.

[0097] Further optional ingredients include non-aqueous solvents, perfume carriers, fluorescers, colourants, hydrotropes, antifoaming agents and opacifiers.

[0098] In addition, compositions may comprise one or more of anti-shrinking agents, anti-wrinkle agents, anti-spotting agents, germicides, fungicides, anti-oxidants, UV absorbers (sunscreens), heavy metal sequestrants, chlorine scavengers, dye fixatives, anti-corrosion agents, drape imparting agents, antistatic agents and ironing aids. The lists of optional components are not intended to be exhaustive. The following non-limiting examples will more fully illustrate specific embodiments of this invention. All parts, percentages and proportions referred to herein and in the appended claims are by weight unless otherwise illustrated. Physical test methods are described below.

Examples

Example 1 - Quickwash evaluation

[0099] A wash program was carried out using a Raitech Quickwash™ machine using the following protocol:

- Wash, 15 minutes @ 40°C
- Drain, 35 seconds
- Rinse, 90 seconds @ 40°C
- Drain, 35 seconds
- Spin, 35 seconds
- Dry, 4 minutes
- Repeat rinse-drain-spin-dry cycle a further three times

[0100] The test comprises a main wash and four rinse steps, giving a total of 5 steps.

[0101] Water - 12°FH (French Hardness) made from demineralised water containing calcium/magnesium chloride, Ca:Mg ratio 2:1 with 1 ppm copper (II) and 1 ppm iron (II) added, both as the sulphate salts. The water volume used in all cases (main wash and each rinse step) was 3.5 litres.

[0102] The fabric used was 10 individual 20x20cm pieces of bleached cotton interlock, non-fluorescent fabric.

[0103] Washing powder - 3.6g of Skip™ (a Unilever-brand bleach containing laundry detergent + 0.5g antifoam (silicone-coated silica granules). Skip™ comprises a fluorescent whitening agent.

[0104] After each wash cycle the level of fluorescer activity was measured on a Datacolor Spectraflash SF600+, UV and specular included, large aperture plate. The emission from the fluorescer was monitored via the peak at 440nm. A higher level of fluorescence indicates a higher whiteness value of the fabric.

[0105] The following compositions were compared in example 1:-

1A - Skip™ (control)
1B - Skip™ + 1 % (by weight) Dispersant only (Suparex KS)
1C - Skip™ + 1 % Sequestrant only (IDS)
1D - Skip™ + 1% Sequestrant (IDS) and 1% Dispersant (Suparex KS)

[0106] The sequestrant and dispersant were dosed equally across each step of the laundry process, e.g. for 1% by

weight of sequestrant, 0.2% would be dosed in the main wash and in each of the subsequent rinse steps.

[0107] The concentration of both the sequestrant and the dispersant was 0.0021 g/L, as each was dosed at 1% of a total formulation of 3.6g, added in five portions across the wash (main wash + 4 rinse steps) to a water content of 3.5 litres in each step.

[0108] The process was repeated for 5 laundry cycles on the fabric. Table 1 shows the reflectance values of the fabric treated with compositions 1A-1 D according to the above protocol.

Table 1 - Reflectance values for example 1

Composition	R440 value
1A	83.8
1B	86.2
1C	89.5
1D	94.3

[0109] It can be seen from table 1 that the combination of transition metal cation sequestrant and dispersant (composition 1 D) provides an added effect over and above the cumulative individual effects.

Example 2

[0110] This example is a comparison of the addition of a sequestrant and a dispersant to the main wash only Vs addition of the same across combination, at the same level dosed across the main wash and rinse steps.

[0111] The protocol was the same as for example 1, with the same levels of materials and substrates used; however a different detergent was used this time. The detergent used in this example was Persil™ Performance, which comprises the same fluorescent whitening agent as Skip™ in the previous example.

[0112] The following compositions were compared in example 2:-

2A - Persil™ Performance (control)
2B - Persil™ Performance + 1% Sequestrant (IDS) and 1% Dispersant (Suparex KS) added to main wash only
2C - Persil™ Performance + 1% Sequestrant (IDS) and 1% Dispersant (Suparex KS) added across the wash (0.2% of each added to the main wash and each of the rinse steps)

[0113] The washing process as outlined in example 1 was carried out, and repeated for 5 laundry cycles on the fabric - in total 5x(main wash + 4 rinses). Table 2 shows the reflectance values of the fabric treated with compositions 2A-2C according to the above protocol.

Table 2 - Reflectance values for example 2

Composition	R440 value
2A	87.44
2B	90.27
2C	96.55

[0114] It can be seen from table 2 that the combination of transition metal cation sequestrant and dispersant added across the wash (in the main wash and 1+ rinse steps) (composition 2C) provides a whiteness benefit over addition of the sequestrant and dispersant to the main wash only.

Example 3 - Washing Machine Study

[0115] Using a different sequestrant (Turpinal™ 4NP ex. Solutia) in combination with the same dispersant Suparex™ KS, a washing machine experiment was conducted.

Wash cycle program:-

[0116] Main wash, 40°C, 35 minutes, 15 litres of water

- Drain
- Four rinses at ambient temperature (~20°C), 90 seconds per rinse
- Spin, 5 minutes @ 1200rpm

[0117] Water quality as per Quickwash experiment of example 1 (12°FH, 1 ppm Cu(II), 1 ppm Fe(II)).

[0118] Load composition: 2.5kg, comprising:

• Two short-sleeved T-shirts (lightweight and heavyweight), one long-sleeve lightweight T-shit, one long-sleeve Easycare shirt and one short-sleeve Easycare shirt.
• Non-fluorescent cotton (interlock, rib and single jersey construction)
• Pre-fluoresced cotton (interlock, rib and single jersey construction washed 10 times in Skip™ to deposit a known fluorescer).

[0119] The loads were washed in three different conditions, 2 controls - Skip™ detergent only, Skip™ detergent in water + copper(II) and iron(II), and in a final condition according to the invention. The conditions were:-

1. 105g Skip™ in 12°FH water
2. 105g Skip™ in 12°FH water containing 1 ppm Cu(II) and 1 ppm iron(II)
3. 105g Skip™ in 12°FH water containing 1 ppm Cu(II) and 1 ppm iron(II) with 1 % on weight of formulation of Turpinal™ 4NP and 1 % on weight of formulation of Suparex™ KS added. These were split equally across the main wash and the four rinses (0.21 g of each) into each stage of the wash).

[0120] After six cycles the reflectance values were measured as before.
Change in reflectance @ 440nm is shown by ΔR440. This value shows the difference between the reflectance between the fabric pre- and post-treatment.

Fabric references:

[0121]

SS032 Long-Sleeve Valueweight T-Shirt
SS260 Slim-Fit T-Shirt
H5180Super Heavyweight Beefy T-Shirt
J945M Short-Sleeve Easycare "Fil-a-Fil" Shirt
J936M Long-Sleeve Pure Cotton Easycare Poplin Shirt
IF - pre-fluoresced cotton interlock
INF - non-fluorescent cotton interlock
SJF - pre-fluoresced cotton single jersey
SJNF - non-fluorescent cotton single jersey
RF - pre-fluoresced cotton rib
RNF - non-fluorescent cotton rib

Fabric	Condition	ΔR440	Fabric	Condition	ΔR440
H5180	1	9.77	IF	1	11.98
	2	-5.04		2	-3/70
	3	1.85		3	3.84
J936M	1	17.02	INF	1	43.52
	2	4.94		2	32.39
	3	14.76		3	36.61
J945M	1	-5.58	SJF	1	12.95
	2	-18.34		2	-0.12
	3	-16.16		3	5.50

(continued)

Fabric	Condition	ΔR440	Fabric	Condition	ΔR440
SS260	1	5.05	SJNF	1	43.05
	2	-13.17		2	33.61
	3	-7.92		3	34.56
SS032	1	3.50	RF	1	12.75
	2	-18.12		2	-1.63
	3	-5.95		3	2.00
			RNF	1	43.85
				2	30.82
				3	35.78

[0122] In all cases, the presence of the agents has improved the fluorescence value (as indicated by a reflectance value closer to that obtained in water without iron and copper present). On the non-fluorescent fabric, the presence of the active agent (sequestrant and dispersant) has resulted in greater fluorescence.

Claims

1. A method of conferring an improved whiteness benefit to a white textile article during a laundry process, comprising the steps of:

   a) provision of an aqueous liquor comprising a laundry treatment composition which comprises a fluorescent whitening agent and an active agent, and,
   b) contacting the white textile article with the aqueous liquor of a);

   characterised in that the active agent comprises:

   i) a transition metal cation sequestrant; and,
   ii) a dispersant which comprises one or more of naphthalene sulphonate-formaldehyde condensates, acrylic polymers, sulphonated styrene/maleic anhydride copolymers or a mixture thereof; and,

   that the white textile article is first contacted with the laundry treatment composition comprising the active agent during a wash step, and is further contacted with active agent made available from a different and separate rinse-added laundry treatment composition.

2. A method as claimed in claim 1, wherein the sequestrant and dispersant are each present in the aqueous liquor at a level of from 0.001 g/l to 1.0g/l.

3. A method as claimed in claim 2, wherein the sequestrant and dispersant are each present in the aqueous liquor at a level of from 0.0015g/l to 0.5g/l.

4. A method as claimed in any one of claims 1 to 3, wherein the laundry treatment composition is a detergent composition comprising an anionic or nonionic detersive surfactant.

5. A method as claimed in any one of claims 1-3, wherein the separate rinse-added laundry treatment composition comprises a quaternary ammonium compound.

6. A method as claimed in any one of claims 1 to 5, wherein contact with further active agent occurs during the final rinse step of the wash process.

7. A method as claimed in any one of claims 1 to 5, wherein contact with further active agent occurs during all rinse

steps of the wash process.

8. A method according to any one of claims 1 to 7, wherein the transition metal cation sequestrant has a binding capacity, log k for copper(II) and iron(II) of greater than 8.

Patentansprüche

1. Verfahren zur Verleihung verbesserter günstiger Weiß-Eigenschaften an einen wei-βen Textilartikel während eines Waschverfahrens, umfassend die Schritte:

   a) Bereitstellen einer wässrigen Flüssigkeit, die eine Wäschebehandlungs-Zusammensetzung umfasst, welche einen optischen Aufheller und ein aktives Mittel umfasst, und
   b) In-Kontakt-Bringen des weißen Textilartikels mit der wässrigen Flüssigkeit von a);

   dadurch gekennzeichnet, dass das aktive Mittel umfasst:

   i) ein Übergangsmetallkation-Sequestriermittel und
   ii) ein Dispergiermittel, das eines oder mehrere von Naphthalinsulfonat-Formaldehyd-Kondensaten, Acrylpolymeren, sulfonierte Styrol/Maleinsäureanhydrid-Copolymeren oder einem Gemisch davon umfasst, und

   dass der weiße Textilartikel zuerst mit der Wäschebehandlungs-Zusammensetzung, die das aktive Mittel umfasst, während eines Waschschritts in Kontakt gebracht wird und außerdem mit aktivem Mittel, das aus einer unterschiedlichen und getrennten, im Spülgang zugesetzten Wäschebehandlungs-Zusammensetzung verfügbar gemacht wird, in Kontakt gebracht wird.

2. Verfahren, wie es in Anspruch 1 beansprucht ist, wobei das Sequestriermittel und das Dispergiermittel jeweils in der wässrigen Flüssigkeit in einer Konzentration von 0,001 g/l bis 1,0 g/l vorhanden sind.

3. Verfahren, wie es in Anspruch 2 beansprucht ist, wobei das Sequestriermittel und das Dispergiermittel jeweils in der wässrigen Flüssigkeit in einer Konzentration von 0,0015 g/l bis 0,5 g/l vorhanden sind.

4. Verfahren, wie es in einem der Ansprüche 1 bis 3 beansprucht ist, wobei die Wäschebehandlungs-Zusammensetzung ein Waschmittel ist, das ein anionisches oder ein nicht-ionisches reinigungsaktives Tensid umfasst.

5. Verfahren, wie es in einem der Ansprüche 1 bis 3 beansprucht ist, wobei die getrennte, dem Spülgang zugesetzte Wäschebehandlungs-Zusammensetzung eine quaternäre Ammoniumverbindung umfasst.

6. Verfahren, wie es in einem der Ansprüche 1 bis 5 beansprucht ist, wobei ein Kontakt mit weiterem aktivem Mittel beim letzten Spülgang des Waschverfahrens erfolgt.

7. Verfahren, wie es in einem der Ansprüche 1 bis 5 beansprucht ist, wobei ein Kontakt mit weiterem aktivem Mittel während aller Spülgänge des Waschverfahrens erfolgt.

8. Verfahren gemäß einem der Ansprüche 1 bis 7, wobei das Übergangsmetallkation-Sequestriermittel eine Bindungskapazität, log κ, für Kupfer(II) und Eisen(II) von größer als 8 hat.

Revendications

1. Procédé pour conférer un avantage de blancheur améliorée à un article textile blanc pendant un procédé de lavage de linge, comprenant les étapes suivantes :

   a) mise à disposition d'une liqueur aqueuse comprenant une composition de traitement du linge qui comprend un agent de blanchiment fluorescent et un agent actif, et
   b) mise en contact de l'article textile blanc avec la liqueur aqueuse en a) ;

   caractérisé en ce que l'agent actif comprend :

i) un séquestrant de cation de métal de transition ; et
ii) un dispersant qui comprend un ou plusieurs condensats de sulfonate-formaldéhyde de naphtalène, des polymères acryliques, des copolymères de styrène sulfoné/anhydride maléique ou un mélange de ceux-ci ; et

en ce que l'article textile blanc est d'abord mis en contact avec la composition de traitement du linge comprenant l'agent actif pendant une étape de lavage, et est, en outre, mis en contact avec l'agent actif rendu disponible par une composition différente et séparée de traitement du linge ajoutée au rinçage.

2. Procédé selon la revendication 1, dans lequel le séquestrant et le dispersant sont chacun présents dans la liqueur aqueuse à raison de 0,001 à 1,0 g/l.

3. Procédé selon la revendication 2, dans lequel le séquestrant et le dispersant sont chacun présents dans la liqueur aqueuse à raison de 0,0015 à 0,5 g/l.

4. Procédé selon l'une quelconque des revendications 1 à 3, dans lequel la composition de traitement du linge est une composition détergente comprenant un tensioactif détersif anionique ou non ionique.

5. Procédé selon l'une quelconque des revendications 1 à 3, dans lequel la composition séparée de traitement du linge ajoutée au rinçage comprend un composé d'ammonium quaternaire.

6. Procédé selon l'une quelconque des revendications 1 à 5, dans lequel le contact avec l'autre agent actif se produit à l'étape de rinçage finale du procédé de lavage.

7. Procédé selon l'une quelconque des revendications 1 à 5, dans lequel le contact avec l'autre agent actif se produit à toutes les étapes de rinçage du procédé de lavage.

8. Procédé selon l'une quelconque des revendications 1 à 7, dans lequel le séquestrant de cation de métal de transition a une capacité de liaison, log k, pour le cuivre(II) et le fer (II) supérieure à 8.

REFERENCES CITED IN THE DESCRIPTION

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