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(54) **DETERGENT COMPOSITIONS**

WASCHMITTEL

COMPOSITIONS DETERGENTES

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Description

TECHNICAL FIELD

[0001] The present invention relates to laundry detergent compositions giving especial benefits in the laundering of white fabrics. The compositions of the invention, which contain a combination of two different sequestrants, have been found to give improved maintenance of colour fidelity, especially of white and light-coloured fabrics, during the wash.

BACKGROUND

[0002] In some countries the water supply contains a relatively high concentration of iron and this can lead to the discolouration (yellowing) of white and light-coloured fabrics on laundering due to the deposition of Fe(III) salts. This changes the appearance and shortens the useful life of the articles.

[0003] WO 00/34427A (Unilever) discloses and claims non-bleaching laundry detergent compositions containing from 0.05 to 2.5 wt% of the sequestrant, iminodisuccinate (IDS) or hydroxyiminodisuccinate (HIDS). The compositions provides improved maintenance and/or restoration of colour fidelity during the wash, especially at low wash pH.

[0004] IDS is known as a detergency builder from US 3 697 453 (Pfizer) and EP 757 094A (Bayer). IDS as a bleach stabiliser is disclosed in EP 509 382A (W R Grace & Co/Hampshire Chemical Corporation) and WO 97 20907A (Procter & Gamble).

[0005] US 5 31B 726 (Henkel) discloses KIDS as a bleach stabiliser in detergent compositions, comparable in effectiveness to diethylenetriamine pentamethylene phosphonate.

[0006] DE 4311440 (Henkel) discloses HIDS with citrate or other polycarboxylates or polymeric polycarboxylates.

[0007] It has now been found that synergistic maintenance of whiteness or colour fidelity may be observed if IDS or HIDS is used in combination with a second compound capable of sequestering heavy metal ions. In particular, the second sequestrant may be a water-soluble polymer containing specified aminocarboxylic structural units, or a so-called "surfactant sequestrant", or sodium glucoheptonate.

[0008] EP 802 177A (Nippon Shokubai) discloses water-soluble aminocarboxylic monomers which are condensation products of an amino acid with a dicarboxylic acid anhydride, for example aspartic acid/maleic anhydride, and homo- and copolymers thereof. Copolymers of these monomers with acrylic acid and/or maleic acid exhibit excellent chelating and dispersing properties and may be incorporated in detergent compositions.

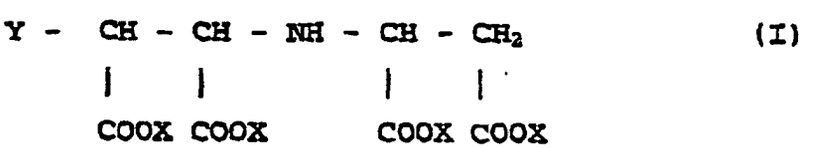
[0009] Magnesium glucoheptonate as a laundry detergent ingredient is disclosed in GB 2 016 540A (Rhône-Poulenc). Peroxyacid bleach particles containing glucoheptonate are disclosed in WO 96 11252A (Eka Nobel AB). The use of sodium glucoheptonate in compositions for hard surface cleaning is disclosed in US 3 956 157 (W R Grace), EP 844 301A (Unilever), GB 2 068 405A (Sandoz).

[0010] EP 757 094A (Bayer) discloses detergent and cleaning compositions containing iminodisuccinates, and also containing polymers containing succinyl units. A specific example contains 23 wt% of tetrasodium iminodisuccinate and 6 wt% of sodium polyaspartate of molecular weight 3000.

DEFINITION OF THE INVENTION

[0011] The present invention provides a laundry detergent composition comprising surfactant, builder, optionally other detergent ingredients, and:

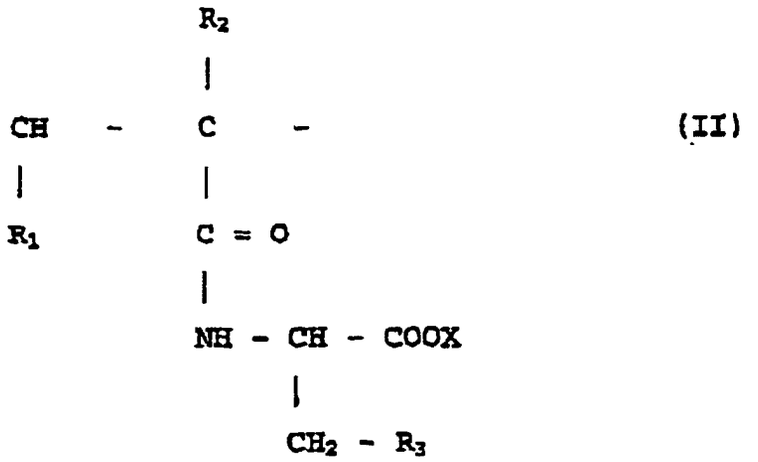
(a) from 0.05 to 2.5 wt% of a first sequestrant of Fe(III) ions which is a compound of the formula I:



wherein Y is H or OH, and each X is individually H or a solubilising cation,
characterised in that it further comprises:

(b) from 0.01 to 2.5 wt% of a second sequestrant of Fe(III) ions selected from

(b) (i) water-soluble polymers comprising structural units of the formula II:

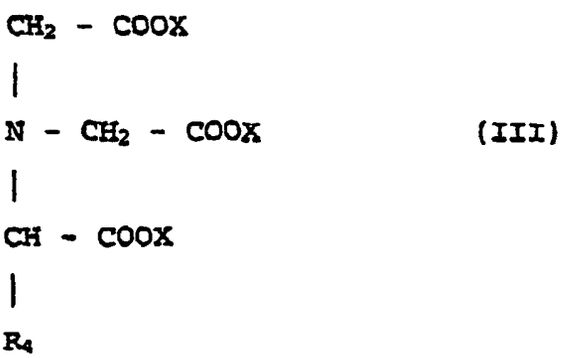


(II)

wherein

R_1 is H or COOX, preferably COOX;
R_2 is H or CH_2COOX but R_1 and R_2 cannot both be H, and R2 is preferably H;
R_3 is COOX, OH or CH_2COOX, preferably COOX;
and each X is individually H or a solubilising cation;

(b) (ii) surfactant sequestrants of the formula III:



(III)

wherein R_4 is a C_8 to C_{18} alkyl group, preferably a C_{12}-C_{14} alkyl group, and each X individually is H or a solubilising cation; and

(b) (iii) compounds of the formula IV:

$$HO - CH_2 - (CH\text{-}OH)_5 - COOX \qquad (IV)$$

wherein X is H or a solubilising cation.

[0012] A further subject of the invention is a method of protecting new white or light-coloured textile fabrics from colour degradation on laundering, which comprises laundering the fabrics by hand or machine in a wash liquor containing a detergent composition as defined above.

[0013] A further subject of the invention is the use of a compound of the formula I above in combination with a second

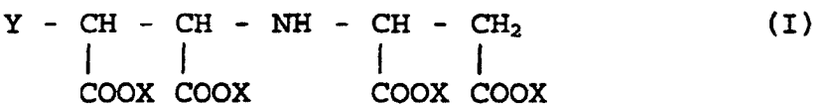
sequestrant for di- and polyvalent metal ions in a laundry detergent composition to protect new white or light-coloured textile fabrics from colour degradation on laundering.

[0014] The term "colour fidelity" is used herein to include both the true colour of coloured fabrics and the whiteness of white fabrics. The benefits of the present invention are especially applicable to white or light-coloured fabrics where iron deposition will cause the greatest deterioration in appearance.

DETAILED DESCRIPTION OF THE INVENTION

The compound of formula I

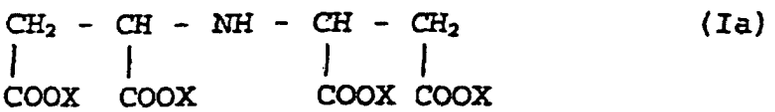
[0015] The detergent compositions of the invention contain, as an essential ingredient, a compound of the formula I:



(I)

wherein Y is H or OH, preferably H; and X is H or a solubilising cation, preferably a sodium ion.

[0016] If Y is a hydrogen atom, the formula I represents iminodisuccinic acid or a water-soluble salt thereof. Iminodisuccinic acid, also known as N-(1,2-carboxyethyl)D,L-aspartic acid, has the formula (Ia) wherein X = H:

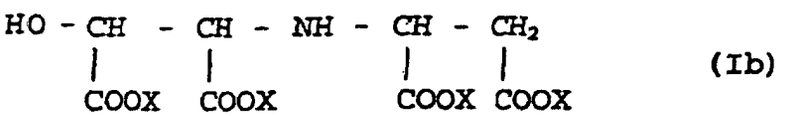


(Ia)

[0017] In the following description, the abbreviation "IDS" will be used to denote this material whether in acid or salt form. IDS is commercially available from Bayer AG, Leverkusen, Germany, and from Nippon Shokubai KK, Japan.

[0018] If Y is a hydroxyl group, the formula I represents hydroxyiminodisuccinic acid or a water-soluble salt thereof.

[0019] Hydroxyiminodisuccinic acid has the formula (Ib) wherein X = H:



(Ib)

[0020] In the following description, the abbreviation "HIDS" will be used to denote this material whether in acid or salt form. HIDS is commercially available from Nippon Shokubai KK, Japan.

[0021] For the purposes of the present invention, the IDS or HIDS may be, and preferably is, in the form of a salt, ie X in the formula I is a stable solubilising cation, preferably an alkali metal cation , more preferably sodium.

[0022] In the laundry detergent compositions of the invention, IDS or HIDS is suitably present in an amount of from 0.05 to 2.5 wt%, preferably from 0.2 to 2.5 wt%, more preferably from 0.3 to 1.5 wt%.

The second sequestrant

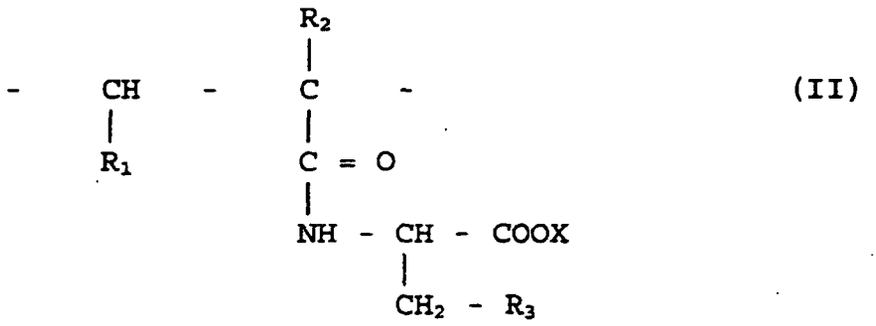
[0023] The compositions of the invention also contain a second compound which is a sequestrant of di- and polyvalent metal ions.

[0024] The optimum amount of the second sequestrant present will depend on the choice of sequestrant, and may range, for example from 0.01 to 2.5 wt%.

[0025] Three preferred classes of second sequestrant are envisaged.

Preferred Embodiment (i)

[0026] According to a first preferred embodiment of the invention, the second sequestrant is a water-soluble polymer comprising structural units of the formula II



(II)

wherein R_1 is H or COOX, R_2 is H or CH_2COOX but R_1 and R_2 cannot both be H, R_3 is COOX, OH or CH_2COOX, and each X is individually H or a solubilising cation.

[0027] These polymers are described and claimed in EP 802 177A (Nippon Shokubai), which describes and claims also the monomers from which they are derived, and detergent compositions containing the polymers.

[0028] The aminocarboxylic monomers from which the structural units of the formula II are derived are condensation products of an amino acid, for example, aspartic acid, serine or glutamic acid with the anhydride of an unsaturated dicarboxylic acid, for example, maleic anhydride, itaconic anhydride or aconitic anhydride. An especially preferred monomer is the condensation product of aspartic acid with maleic anhydride, giving in the polymer structural units of the formula II in which R_1 is COOX, R_2 is H and R_3 is COOX.

[0029] The water-soluble polymers may be homo- or copolymers. Especially preferred are copolymers comprising at least 15 mole%, preferably at least 20 mole%, of structural units of the formula II. The copolymers may further comprise structural units of unsaturated mono- or dicarboxylic acids. Preferred copolymers contain structural units of maleic acid and/or acrylic acid.

[0030] Preferred copolymers comprise from 15 to 50 mole% of structural units of the formula II, from 50 to 85 mole% of structural units of acrylic acid, and optionally from 0 to 15 mole% of structural units of maleic acid. Especially preferred are terpolymers comprising from 20 to 30 mole% of structural units of the formula II, from 60 to 80 mole% of structural units of acrylic acid, and from 1 to 10 mole% of structural units of maleic acid.

[0031] An especially preferred polymer contains 25 mole% of structural units of a condensation product of aspartic acid and maleic anhydride (MA-Asp), 5 mole% of maleic acid (MA) units, and 70 mole% of acrylic acid (AA) units. This polymer will be referred to hereinafter as a MA-Asp/MA/AA terpolymer.

[0032] The polymer suitably has a weight average molecular weight of from 800 to 8 million, preferably from 1000 to 100 000. Polymers having a weight average molecular weight of 2000 to 10 000 are preferred.

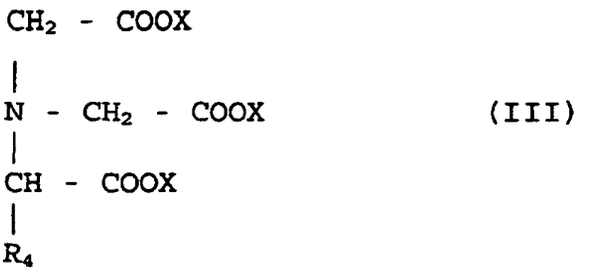
[0033] The polymer may suitably be present in the composition in the invention in an amount of from 0.01 to 2 wt%, more preferably from 0.02 to 1 wt% and most preferably from 0.02 to 0.5 wt%.

Preferred embodiment (ii)

[0034] According to a second preferred embodiment of the invention, the second sequestrant is "surfactant sequestrant", that is to say, a sequestrant molecule that includes a hydrophobic moiety, for example, a long-chain alkyl group.

[0035] Examples of surfactant sequestrants are aminopolycarboxylates containing at least three carboxyl groups, and a C_8-C_{18} alkyl chain.

[0036] A preferred surfactant sequestrant is a compound of the formula III



(III)

wherein R_4 is a C_8 to C_{18} alkyl group, preferably a C_{12}-C_{14} alkyl group, and each X individually is H or a solubilising cation. This compound, alkylglycine diacetic acid, will be referred to hereinafter as AGDA. AGDA is commercially available from BASF AG, Germany.

[0037] AGDA or other surfactant sequestrant may suitably be present in the compositions of the invention in an amount of from 0.05 to 2.5 wt%, preferably from 0.1 to 2.0 wt%.

Preferred embodiment (iii)

[0038] According to a third preferred embodiment of the invention, the second sequestrant is a compound of the formula IV

$$HO - CH_2 - (CH\text{-}OH)_5 - COOX \qquad (IV)$$

wherein X is H or a solubilising cation.

[0039] This compound is a glucoheptonate.

[0040] Glucoheptonate, preferably sodium glucoheptonate, may suitably be present in an amount of from 0.01 to 2 wt%, preferably from 0.02 to 1 wt%.

Detergent compositions

[0041] The composition of the invention also contains other conventional detergent ingredients. Essential ingredients are surfactants (detergent-active compounds) and detergency builders, and other conventional ingredients may optionally be present.

[0042] Detergent compositions of the invention may suitably comprise from 5 to 60 wt% of one or more detergent surfactants and from 10 to 80 wt% of one or more detergency builders, as well as the preferred amounts of the first and second sequestrants, and optionally other detergent ingredients to 100 wt%.

[0043] According to one preferred embodiment of the invention, the compositions of the invention may be substantially free of bleaching ingredients.

Detergent ingredients

[0044] The detergent compositions will contain, as essential ingredients, one or more detergent active compounds (surfactants) which may be chosen from soap and non-soap anionic, cationic, nonionic, amphoteric and zwitterionic detergent active compounds, and mixtures thereof. Many suitable detergent active compounds are available and are fully described in the literature, for example, in "Surface-Active Agents and Detergents", Volumes I and II, by Schwartz, Perry and Berch.

[0045] The preferred detergent active compounds that can be used are soaps and synthetic non-soap anionic and nonionic compounds.

[0046] Anionic surfactants are well-known to those skilled in the art. Examples include alkylbenzene sulphonates, particularly linear alkylbenzene sulphonates having an alkyl chain length of C_8-C_{15}; primary and secondary alkylsulphates, particularly C_8-C_{15} primary alkyl sulphates; alkyl ether sulphates; olefin sulphonates; alkyl xylene sulphonates; dialkyl sulphosuccinates; and fatty acid ester sulphonates. Sodium salts are generally preferred.

[0047] Nonionic surfactants that may be used include the primary and secondary alcohol ethoxylates, especially the C_8-C_{20} aliphatic alcohols ethoxylated with an average of from 1 to 20 moles of ethylene oxide per mole of alcohol, and more especially the C_{10}-C_{15} primary and secondary aliphatic alcohols ethoxylated with an average of from 1 to 10

moles of ethylene oxide per mole of alcohol. Non-ethoxylated nonionic surfactants include alkylpolyglycosides, glycerol monoethers, and polyhydroxyamides (glucamide).

[0048] Cationic surfactants that may be used include quaternary ammonium salts of the general formula $R_1R_2R_3R_4N^+ X^-$ wherein the R groups are long or short hydrocarbyl chains, typically alkyl, hydroxyalkyl or ethoxylated alkyl groups, and X is a solubilising cation (for example, compounds in which R_1 is a C_8-C_{22} alkyl group, preferably a C_8-C_{10} or C_{12}-C_{14} alkyl group, R_2 is a methyl group, and R_3 and R_4, which may be the same or different, are methyl or hydroxyethyl groups); and cationic esters (for example, choline esters).

[0049] In an especially preferred cationic surfactant of the general formula $R_1R_2R_3R_4N^+ X^-$, R_1 represents a C_8-C_{10} or C_{12}-C_{14} alkyl group, R_2 and R_3 represent methyl groups, and R_4 presents a hydroxyethyl group.

[0050] Amphoteric surfactants, for example, amine oxides, and zwitterionic surfactants, for example, betaines, may also be present.

[0051] Preferably, the quantity of anionic surfactant is in the range of from 5 to 50% by weight of the total composition. More preferably, the quantity of anionic surfactant is in the range of from 8 to 35% by weight.

[0052] Nonionic surfactant, if present, is preferably used in an amount within the range of from 1 to 20% by weight.

[0053] The total amount of surfactant present is preferably within the range of from 5 to 60 wt%.

[0054] The compositions may suitably contain from 10 to 80%, preferably from 15 to 70% by weight, of detergency builder. Preferably, the quantity of builder is in the range of from 15 to 50% by weight.

[0055] The detergent compositions may contain as builder a crystalline aluminosilicate, preferably an alkali metal aluminosilicate, more preferably a sodium aluminosilicate (zeolite).

[0056] The zeolite used as a builder may be the commercially available zeolite A (zeolite 4A) now widely used in laundry detergent powders. Alternatively, the zeolite may be maximum aluminium zeolite P (zeolite MAP) as described and claimed in EP 384 070B (Unilever), and commercially available as Doucil (Trade Mark) A24 from Crosfield Chemicals Ltd, UK. Zeolite MAP is defined as an alkali metal aluminosilicate of zeolite P type having a silicon to aluminium ratio not exceeding 1.33, preferably within the range of from 0.90 to 1.33, preferably within the range of from 0.90 to 1.20.

[0057] Especially preferred is zeolite MAP having a silicon to aluminium ratio not exceeding 1.07, more preferably about 1.00. The particle size of the zeolite is not critical. Zeolite A or zeolite MAP of any suitable particle size may be used.

[0058] Also preferred according to the present invention are phosphate builders, especially sodium tripolyphosphate. This may be used in combination with sodium orthophosphate, and/or sodium pyrophosphate.

[0059] Other inorganic builders that may be present additionally or alternatively include sodium carbonate, layered silicate, amorphous aluminosilicates.

[0060] Organic builders that may be present include polycarboxylate polymers such as polyacrylates and acrylic/maleic copolymers; polyaspartates; monomeric polycarboxylates such as citrates, gluconates, oxydisuccinates, glycerol mono-di- and trisuccinates, carboxymethyloxysuccinates, carboxymethyloxymalonates, dipicolinates, hydroxyethyliminodiacetates, alkyl- and alkenylmalonates and succinates; and sulphonated fatty acid salts.

[0061] Organic builders may be used in minor amounts as supplements to inorganic builders such as phosphates and zeolites. Especially preferred supplementary organic builders are citrates, suitably used in amounts of from 5 to 30 wt %, preferably from 10 to 25 wt %; and acrylic polymers, more especially acrylic/maleic copolymers, suitably used in amounts of from 0.5 to 15 wt %, preferably from 1 to 10 wt%.

[0062] Builders, both inorganic and organic, are preferably present in alkali metal salt, especially sodium salt, form.

[0063] Detergent compositions according to the invention may also suitably contain a bleach system, although, as previously indicated, non-bleaching formulations are also within the scope of the invention.

[0064] The bleach system is preferably based on peroxy bleach compounds, for example, inorganic persalts or organic peroxyacids, capable of yielding hydrogen peroxide in aqueous solution. Suitable peroxy bleach compounds include organic peroxides such as urea peroxide, and inorganic persalts such as the alkali metal perborates, percarbonates, perphosphates, persilicates and persulphates. Preferred inorganic persalts are sodium perborate monohydrate and tetrahydrate, and sodium percarbonate.

Especially preferred is sodium percarbonate having a protective coating against destabilisation by moisture. Sodium percarbonate having a protective coating comprising sodium metaborate and sodium silicate is disclosed in GB 2 123 044B (Kao).

[0065] The peroxy bleach compound is suitably present in an amount of from 5 to 35 wt%, preferably from 10 to 25 wt%.

[0066] The peroxy bleach compound may be used in conjunction with a bleach activator (bleach precursor) to improve bleaching action at low wash temperatures. The bleach precursor is suitably present in an amount of from 1 to 8 wt%, preferably from 2 to 5 wt%.

[0067] Preferred bleach precursors are peroxycarboxylic acid precursors, more especially peracetic acid precursors and peroxybenzoic acid precursors; and peroxycarbonic acid precursors. An especially preferred bleach precursor suitable for use in the present invention is N,N,N',N'-tetracetyl ethylenediamine (TAED). The novel quaternary ammo-

nium and phosphonium bleach precursors disclosed in US 4 751 015 and US 4 818 426 (Lever Brothers Company) and EP 402 971A (Unilever) are also of great interest. Especially preferred are peroxycarbonic acid precursors, in particular cholyl-4-sulphophenyl carbonate. Also of interest are peroxybenzoic acid precursors, in particular, N,N,N-trimethylammonium toluoyloxy benzene sulphonate; and the cationic bleach precursors disclosed in EP 284 292A and EP 303 520A (Kao).

[0068] A bleach stabiliser (heavy metal sequestrant) may also be present. Other than IDS, suitable bleach stabilisers include ethylenediamine tetraacetate (EDTA) and the polyphosphonates such as Dequest (Trade Mark), EDTMP.

[0069] The detergent compositions may also contain one or more enzymes. Suitable enzymes include the proteases, amylases, cellulases, oxidases, peroxidases and lipases usable for incorporation in detergent compositions.

[0070] Preferred proteolytic enzymes (proteases) are catalytically active protein materials which degrade or alter protein types of stains when present as in fabric stains in a hydrolysis reaction. They may be of any suitable origin, such as vegetable, animal, bacterial or yeast origin.

Proteolytic enzymes or proteases of various qualities and origins and having activity in various pH ranges of from 4-12 are available. Proteases of both high and low isoelectric point are suitable.

[0071] Other enzymes that may suitably be present include lipases, amylases, and cellulases including high-activity cellulases such as "Carezyme").

[0072] In particulate detergent compositions, detergency enzymes are commonly employed in granular form in amounts of from about 0.1 to about 3.0 wt%. However, any suitable physical form of enzyme may be used in any effective amount.

[0073] Antiredeposition agents, for example cellulose esters and ethers, for example sodium carboxymethyl cellulose, may also be present.

[0074] The compositions may also contain soil release polymers, for example sulphonated and unsulphonated PET/POET polymers, both end-capped and non-end-capped, and polyethylene glycol/polyvinyl alcohol graft copolymers such as Sokolan (Trade Mark) HP22.

[0075] Especially preferred soil release polymers are the sulphonated non-end-capped polyesters described and claimed in WO 95 32997A (Rhodia Chimie).

[0076] Other ingredients that may be present include solvents, hydrotropes, fluorescers, photobleaches, foam boosters or foam controllers (antifoams) as appropriate, sodium carbonate, sodium bicarbonate, sodium silicate, sodium sulphate, calcium chloride, other inorganic salts, fabric conditioning compounds, and perfumes.

Product form and preparation

[0077] As previously indicated, the compositions of the invention may be of any suitable physical form, for example, particulates (powders, granules, tablets), liquids, pastes, gels or bars.

[0078] According to one especially preferred embodiment of the invention, the detergent composition is in particulate form.

[0079] If necessary, the IDS may be incorporated in particulate compositions in the form of granules containing an inert carrier material.

[0080] Powders of low to moderate bulk density may be prepared by spray-drying a slurry, and optionally postdosing (dry-mixing) further ingredients, in which case the sequestrants may be either incorporated via the slurry or postdosed. "Concentrated" or "compact" powders may be prepared by mixing and granulating processes, for example, using a high-speed mixer/granulator, or other non-tower processes.

[0081] According to another especially preferred embodiment of the invention, the detergent composition is in liquid form.

[0082] Liquid detergent compositions may be prepared by admixing the essential and optional ingredients in any desired order to provide compositions containing the ingredients in the the requisite concentrations.

EXAMPLES

[0083] The invention will now be illustrated in further detail by means of the following Examples, in which parts and percentages are by weight unless otherwise stated.

[0084] In the Examples the following abbreviations are used:

IDS	Iminodisuccinate, sodium salt (ex Bayer)
MA-Asp/MA/AA	Terpolymer (25/5/70) of aspartate/maleate, maleate and acrylate, M_w 5000 (ex Nippon Shokubai)
AGDA	C_{12-14} alkylglycine diacetate, sodium salt

NaLAS Sodium linear alkylbenzene sulphonate

SLES Sodium lauryl ether sulphate

SCMC Sodium carboxymethyl cellulose

EXAMPLES 1 to 3, COMPARATIVE EXAMPLES A to D

Protection of new white cotton fabrics from discolouration by Fe(III) ions using sequestrants

[0085] The experimental procedure was as follows.

[0086] The sequestrants, in the concentrations indicated below, were added (IDS first, then the second sequestrant) to 1 litre of demineralised water in a tergotometer pot, then iron(III) chloride was added in an amount sufficient to give a Fe(III) concentration of 10 ppm. The pH of the solution was adjusted to 9.5 (±0.1) by adding sodium hydroxide solution. Three 10x10 cm pieces (approximately 5 grams) of desized non-fluorescent white cotton cloth were added to provide a liquor to cloth ratio of 200:1. A tergotometer wash was then carried out at 30°C and 90 rpm for 30 minutes. The cloths were then rinsed in demineralised water and dried overnight. Reflectance values at 420nm were taken for the cloths before and after washing, and ΔR at 420nm calculated to give an indication of the amount of iron deposition onto the cloth.

[0087] The ideal here is for a result as close as possible to zero, indicating no deposition of iron and no visible deterioration in appearance.

[0088] The concentrations for the sequestrants were chosen as follows:

0.008g/l, equivalent to 0.2 wt% of a detergent composition used at a typical consumer dosage of 4 g/l;
0.0008 g/l, equivalent to 0.02 wt% of a detergent composition used at a typical consumer dosage of 4 g/l.

[0089] Average changes in reflectance are shown in the following Table.

Example	Sequestrant	Concentration Equivalent (wt%)	ΔR 420 nm
A	IDS	0.20	-26.01
B	MA-Asp/MA/AA	0.02	-42.71
C	AGDA	0.20	-22.96
D	Na glucoheptonate	0.02	-22.59
1	IDS MA-Asp/MA/AA	0.20 0.02	-5.31
2	IDS AGDA	0.20 0.20	-4.99
3	IDS Na glucoheptonate	0.20 0.02	-4.16

EXAMPLES 4 to 6

Detergent compositions

Example 4 - spray-dried detergent powder

[0090]

	wt%
Sodium linear alkylbenzene sulphonate (NaLAS)	22.92
Sodium silicate (anhydrous)	4.67
Sodium tripolyphosphate	18.67

(continued)

	wt%
Sodium carboxymethyl cellulose	0.25
Polyacrylate polymer	0.70
Calcite	10.00
IDS	0.05-2.5
Second sequestrant	0.01-2.5
Sodium sulphate, water, impurities	to 100

Examples 5 to 7: concentrated detergent powders

[0091]

	5	6	7
NaLAS	15.63	22.82	18.00
Nonionic C_{12-15} 7EO	7.00		3.25
Na sulphate			1.30
Na tripolyphosphate		30.57	
SCMC	0.60	0.77	1.00
Polymer**		1.96	2.00
Zeolite (78%)	44.65	23.13	50.00
Na carbonate	12.12	6.73	19.00
Na bicarbonate	17.77	5.87	
Enzymes	2.00	0.51	0.45
IDS	0.05-2.5	0.05-2.5	0.05-2.5
Second sequestrant	0.01-2.5	0.01-2.5	0.01-2.5
Fluorescer, perfume, speckles, water	to 100	to 100	to 100

Examples 8 and 9: liquid detergent compositions

[0092]

	8	9
NaLAS	12.50	10.50
Nonionic C_{12-15} 7EO		2.25
SLES	6.66	2.25
Na tripolyphosphate		15.00
Mg sulphate ($7H_2O$)	2.50	
Na tetraborate		4.00
Boric acid	0.50	
Glycerine CP		6.00
Acrylic/maleic copolymer		0.12
Preservatives	0.08	

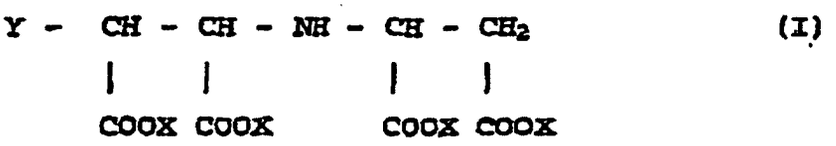
(continued)

	8	9
Blue dye	0.02	
IDS	0.05-2.5	0.05-2.5
Second sequestrant	0.01-2.5	0.01-2.5
Perfume	0.15	0.40
Water	to 100	to 100

Claims

1. A laundry detergent composition comprising surfactant, builder, optionally other detergent ingredients, and:

(a) from 0.05 to 2.5 wt% of a first sequestrant of Fe (III) ions which is a compound of the formula I:

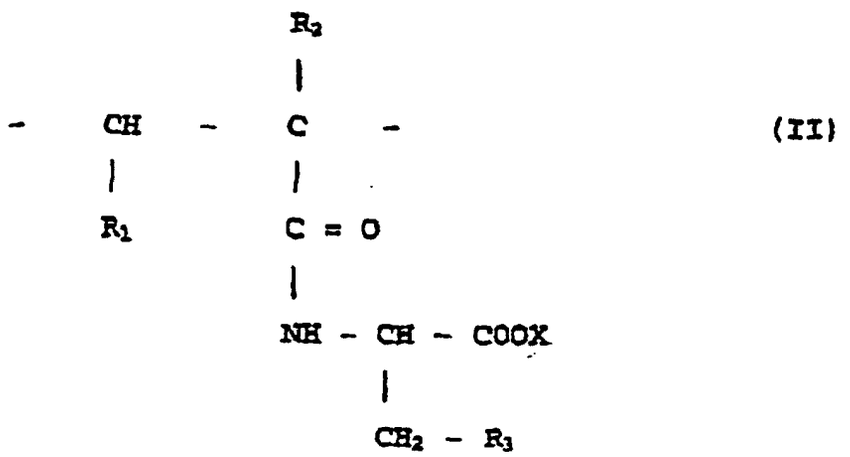


(I)

wherein Y is H or OH, and each X is individually H or a solubilizing cation,
characterised in that it further comprises:

(b) from 0.01 to 2.5 wt% of a second sequestrant of Fe(III) ions selected from

(b) (i) water-soluble polymers comprising structural units of the formula II:

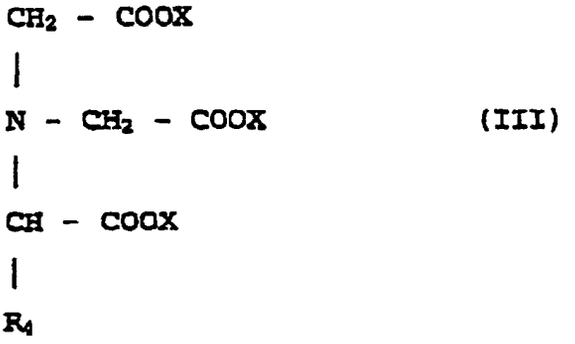


(II)

wherein

R_1 is H or COOX, preferably COOX;
R_2 is H or CH_2COOX but R_1 and R_2 cannot both be H, and R2 is preferably H;
R_3 is COOX, OH or CH_2COOX, preferably COOX;
and each X is individually H or a solubilising cation;

(b) (ii) surfactant sequestrants of the formula III:



(III)

wherein R_4 is a C_8 to C_{18} alkyl group, preferably a C_{12}-C_{14} alkyl group, and each X individually is H or a solubilising cation; and

(b) (iii) compounds of the formula IV:

$$HO - CH_2 - (CH\text{-}OH)_5 - COOX \qquad (IV)$$

wherein X is H or a solubilising cation.

2. A detergent composition as claimed in claim 1, **characterised in that** the first sequestrant (a) is iminodisuccinate or hydroxyiminodisuccinate.

3. A detergent composition as claimed in claim 1 or claim 2, **characterised in that** the first sequestrant (a) is present in an amount of from 0.1 to 2.0 wt% of the composition.

4. A detergent composition as claimed in any preceding claim, **characterised in that** the second sequestrant (b) is a water-soluble polymer (b) (i) comprising at least 15 mole%, preferably at least 20 mole%, of structural units of the formula II.

5. A detergent composition as claimed in any preceding claim, **characterised in that** the second sequestrant (b) is a water-soluble polymer (b) (i) which is a copolymer further comprising structural units of an unsaturated mono-carboxylic acid and/or an unsaturated dicarboxylic acid.

6. A detergent composition as claimed in claim 5, **characterised in that** the polymer (b) (i) is a copolymer comprising:

from 15 to 50 mole%, preferably from 20 to 30 mole%, of structural units of the formula II,

from 50 to 85 mole%, preferably from 60 to 80 mole%, of structural units of acrylic acid, and optionally from 0 to 15 mole%, preferably from 1 to 10 mole%, of structural units of maleic acid.

7. A detergent composition as claimed in any one of claims 4 to 6, **characterised in that** the polymer (b) (i) has a weight average molecular weight within the range of from 1000 to 100 000, preferably from 2000 to 10 000.

8. A detergent composition as claimed in any one of claims 4 to 7, **characterised in that** the polymer (b) (i) is present in an amount of from 0.01 to 2 wt%, preferably from 0.02 to 1 wt%, more preferably from 0.02 to 0.5 wt%, based on the composition.

9. A detergent composition as claimed in any one of claims 1 to 3, **characterised in that** the second sequestrant (b) is a surfactant sequestrant (b) (ii) present in an amount of from 0.05 to 2.5 wt%, preferably from 0.1 to 2.0 wt%, of the composition.

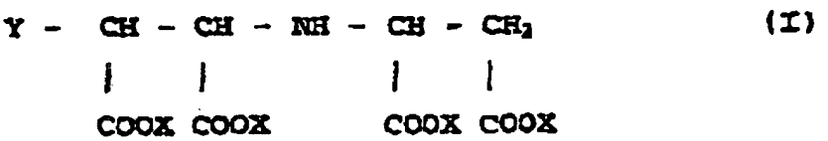
10. A detergent composition as claimed in anyone of claims 1 to 3, **characterised in that** the second sequestrant (b) is a compound of the formula IV (b) (iii) present in an amount of from 0.01 to 2 wt%, preferably from 0.02 to 1 wt%, more preferably from 0.02 to 0.5 wt%, based on the composition.

11. A detergent composition as claimed in any preceding claim, **characterised in that** it comprises from 5 to 60 wt% of one or more detergent surfactants and from 10 to 80 wt% of one or more detergency builders.

12. A detergent composition as claimed in any preceding claim, which is substantially free of bleach ingredients.

13. A method of protecting new white or light-coloured textile fabrics from colour degradation on laundering, **characterised in that** it comprises laundering the fabrics by hand or machine in a wash liquor containing a detergrent composition as claimed in any one of claims 1 to 12.

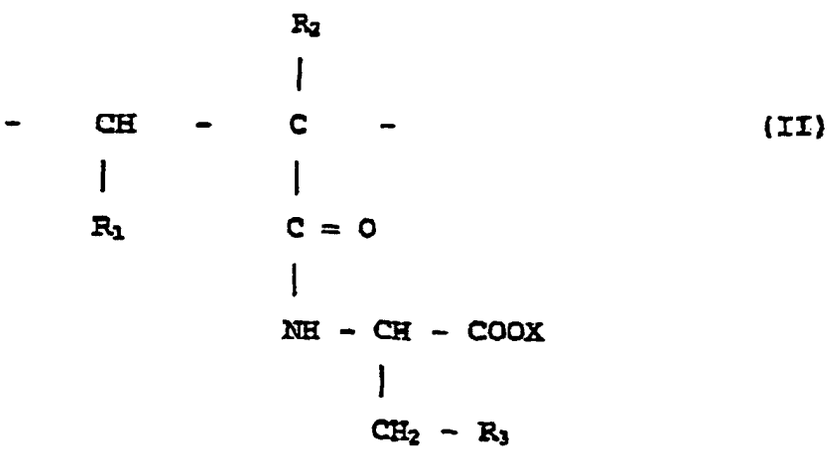
14. Use of a compound of the formula I:



(I)

wherein Y is H or OH, and each X is individually H or a solubilising cation, in combination with a second sequestrant for Fe(III) ions, selected from

(i) water-soluble polymers comprising structural units of the formula II:

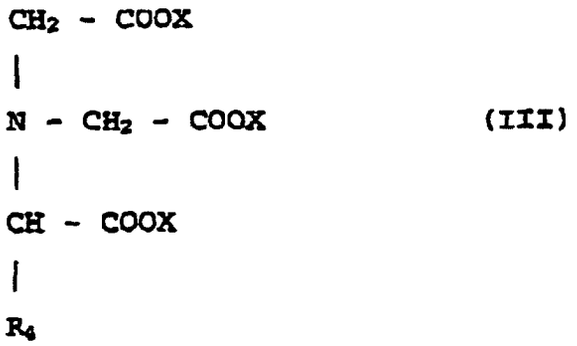


(II)

wherein

R_1 is H or COOX, preferably COOX;
R_2 is H or CR_2CCOX but R_1 and R_2 cannot both be H, and R2 is preferably H;
R_3 is COOX, OH or CH_2COOX, preferably COOX;
and each X is individually H or a solubilising cation;

(ii) surfactant sequestrants of the formula III:



(III)

wherein R_4 is a C_8 to C_{18} alkyl group, preferably a C_{12}-C_{14} alkyl group, and each X individually is H or a solubilising cation; and

(iii) compounds of the formula IV:

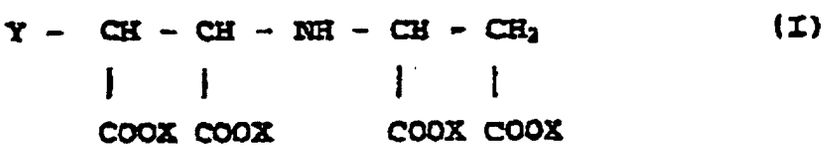
(IV)

wherein X is H or a solubilising cation;
in a laundry detergent composition to protect new white or light-coloured textile fabrics from colour degradation on laundering.

Patentansprüche

1. Wäschereinigungszusammensetzung, umfassend ein oberflächenaktives Mittel, einen Aufbaustoff, gegebenenfalls andere Reinigungsmittelinhaltsstoffe und:

(a) 0,05 bis 2,5 Gew.-% eines ersten Maskierungsmittels aus Fe(III)-Ionen, das eine Verbindung der Formel I ist:

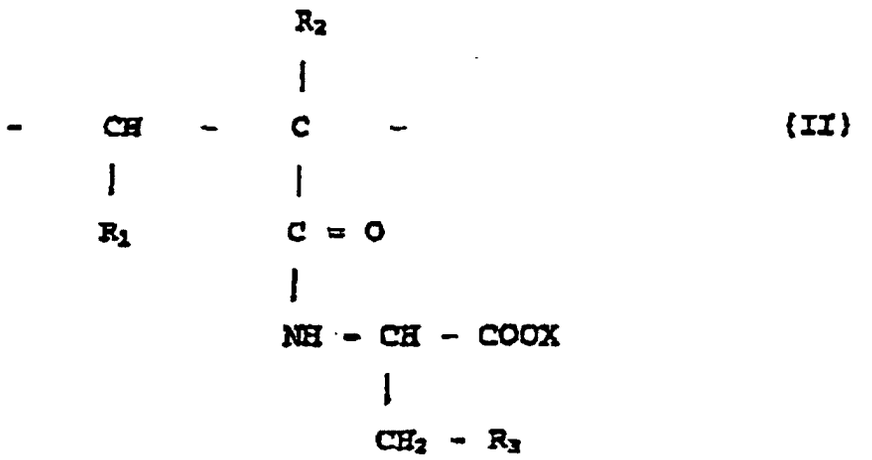


(I)

worin Y H oder OH ist und jedes X jeweils H oder ein löslichmachendes Kation ist; **dadurch gekennzeichnet, daß** sie weiterhin:

(b) 0,01 bis 2,5 Gew.-% eines zweiten Maskierungsmittels aus Fe(III)-Ionen, ausgewählt aus

(b) (i) wasserlöslichen Polymeren, die Struktureinheiten der Formel II umfassen:

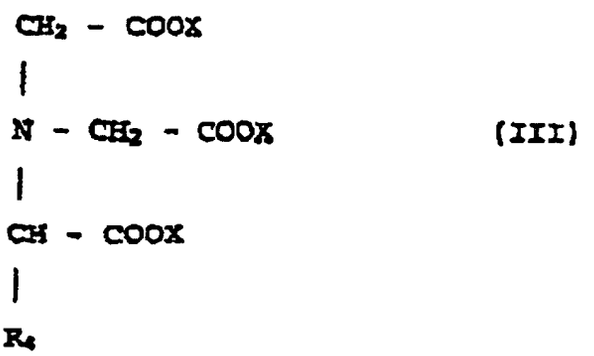


(II)

worin

R_1 H oder COOX, vorzugsweise COOX ist;
R_2 H oder CH_2COOX ist, aber R_1 und R_2 nicht beide H sein können und R_2 vorzugsweise H ist;
R_3 COOX, OH oder CH_2COOX, vorzugsweise COOX ist und
jedes X jeweils H oder ein löslichmachendes Kation ist;

(b) (ii) oberflächenaktiven Maskierungsmitteln der Formel III:



(III)

worin

R_4 eine C_8-C_{18}-Alkylgruppe ist, vorzugsweise eine C_{12}-C_{14}-Alkylgruppe, und
jedes X jeweils H oder ein löslichmachendes Kation ist;

und

(b) (iii) Verbindungen der Formel IV:

$$HO\text{-}CH_2\text{-}(CH\text{-}OH)_5\text{-}COOX \qquad (IV)$$

worin X H oder ein löslichmachendes Kation ist,

umfaßt.

2. Reinigungszusammensetzung nach Anspruch 1, **dadurch gekennzeichnet, daß** das erste Maskierungsmittel (a) Iminodisuccinat oder Hydroxyiminodisuccinat ist.

3. Reinigungszusammensetzung nach Anspruch 1 oder Anspruch 2, **dadurch gekennzeichnet, daß** das erste Maskierungsmittel (a) in einer Menge von 0,1 bis 2,0 Gew.-% der Zusammensetzung vorliegt.

4. Reinigungszusammensetzung nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, daß** das zweite Maskierungsmittel (b) ein wasserlösliches Polymer (b) (i) ist, umfassend zumindest 15 mol-%, vorzugsweise zumindest 20 mol-% an Struktureinheiten der Formel II.

5. Reinigungszusammensetzung nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, daß** das zweite Maskierungsmittel (b) ein wasserlösliches Polymer (b) (i) ist, das ein Copolymer ist, das ferner Struktureinheiten aus einer ungesättigten Monocarbonsäure und/oder einer ungesättigten Dicarbonsäure umfaßt.

6. Reinigungszusammensetzung nach Anspruch 5, **dadurch gekennzeichnet, daß** das Polymer (b)(i) ein Copolymer ist, umfassend

   15 bis 50 mol-%, vorzugsweise 20 bis 30 mol-% an Struktureinheiten der Formel II,
   50 bis 85 mol-%, vorzugsweise 60 bis 80 mol-% an Struktureinheiten aus Acrylsäure, und gegebenenfalls 0 bis 15, vorzugsweise 1 bis 10 mol-% an Struktureinheiten aus Maleinsäure.

7. Reinigungszusammensetzung nach einem der Ansprüche 4 bis 6, **dadurch gekennzeichnet, daß** das Polymer (b) (i) ein gewichtsmittleres Molekulargewicht im Bereich von 1.000 bis 100.000, vorzugsweise 2.000 bis 10.000 aufweist.

8. Reinigungszusammensetzung nach einem der Ansprüche 4 bis 7, **dadurch gekennzeichnet, daß** das Polymer (b) (i) in einer Menge von 0,01 bis 2 Gew.-%, vorzugsweise 0,02 bis 1 Gew.-%, stärker bevorzugt von 0,02 bis 0,5 Gew.-%, basierend auf der Zusammensetzung, vorliegt.

9. Reinigungszusammensetzung nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, daß** das zweite Maskierungsmittel (b) ein oberflächenaktives Maskierungsmittel (b) (ii) ist, das in einer Menge von 0,05 bis 2,5 Gew.-%, vorzugsweise 0,1 bis 2,0 Gew.-% der Zusammensetzung vorliegt.

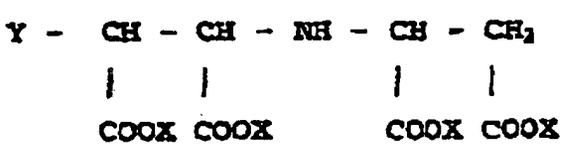
10. Reinigungszusammensetzung nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, daß** das zweite Maskierungsmittel (b) eine Verbindung der Formel IV (b) (iii) ist, das in einer Menge von 0,01 bis 2 Gew.-%, vorzugsweise 0,02 bis 1 Gew.-%, stärker bevorzugt von 0,02 bis 0,5 Gew.-%, basierend auf der Zusammensetzung, vorliegt.

11. Reinigungszusammensetzung nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, daß** es 5 bis 60 Gew.-% von einem oder mehreren oberflächenaktiven Reinigungsmitteln und 10 bis 80 Gew.-% von einem oder mehreren Aufbaustoffen umfaßt.

12. Reinigungszusammensetzung nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, daß** es im wesentlichen frei von Bleichmittelinhaltsstoffen ist.

13. Verfahren zum Schutz neuer weißer oder hellfarbiger Textilgewebe vor der Farbverschlechterung beim Waschen, **dadurch gekennzeichnet, daß** es das Waschen des Gewebes per Hand oder einer Maschine in einer Waschflüssigkeit, die eine Reinigungszusammensetzung wie in einem der Ansprüche 1 bis 12 beansprucht, umfaßt.

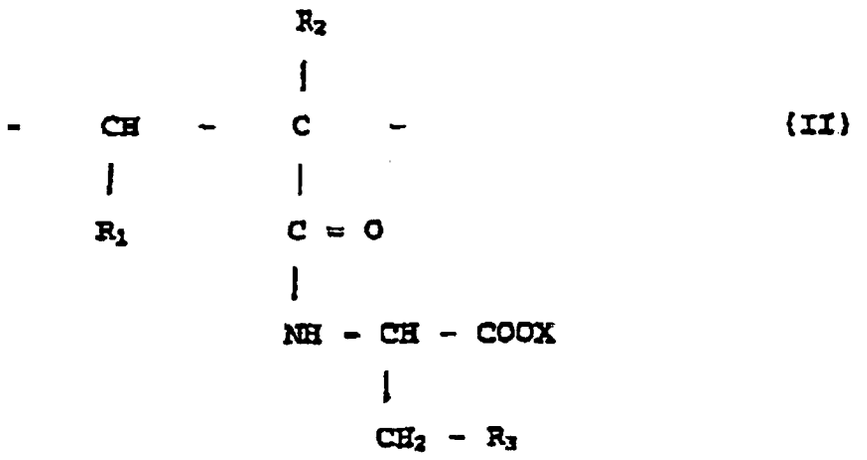
14. Verwendung einer Verbindung der Formel I:



(I)

worin Y H oder OH ist und jedes X jeweils H oder ein löslichmachendes Kation ist; in Kombination mit einem zweiten Maskierungsmittel für Fe(III)-Ionen, ausgewählt aus:

(i) wasserlöslichen Polymeren, die Struktureinheiten der Formel II umfassen:

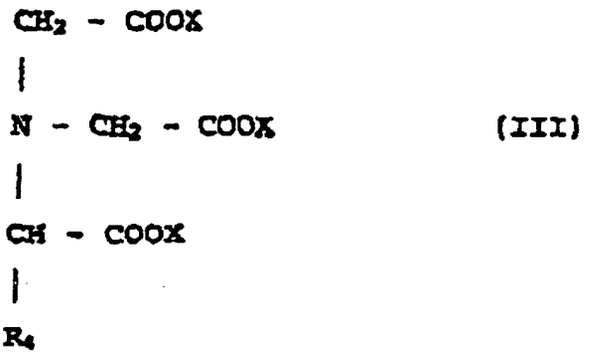


(II)

worin

R_1 H oder COOX, vorzugsweise COOX ist;
R_2 H oder CH_2COOX ist, aber R_1 und R_2 nicht beide H sein können und R_2 vorzugsweise H ist;
R_3 COOX, OH oder CH_2COOX, vorzugsweise COOX ist und jedes X jeweils H oder ein löslichmachendes Kation ist;

(ii) oberflächenaktiven Maskierungsmitteln der Formel III:



(III)

worin R_4 eine C_8-C_{18}-Alkylgruppe ist, vorzugsweise eine C_{12}-C_{14}-Alkylgruppe, und jedes X jeweils H oder ein löslichmachendes Kation ist; und

(iii) Verbindungen der Formel IV:

$$HO\text{-}CH_2\text{-}(CH\text{-}OH)_5\text{-}COOX \qquad (IV)$$

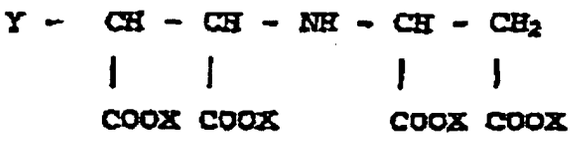
worin X H oder ein löslichmachendes Kation ist;
in einer Wäschereinigungszusammensetzung zum Schutz neuer weißer oder hellfarbiger Textilgewebe vor Farbverschlechterung bei der Wäsche.

Revendications

1. Composition détergente pour linge comprenant un tensioactif, un adjuvant pour détergent, éventuellement d'autres

ingrédients de détergent, et :

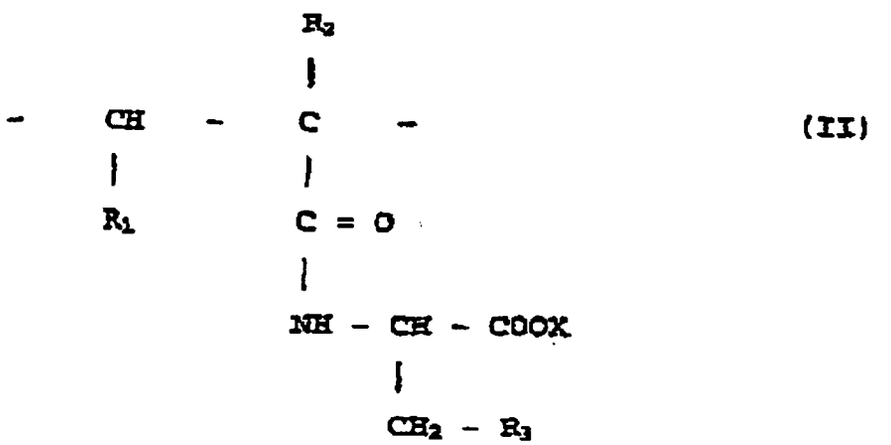
(a) de 0,05 à 2,5 % en poids d'un premier séquestrant des ions Fe(III) qui est un composé de formule I :



(I)

dans laquelle Y est H ou OH, et chaque X est individuellement H ou un cation solubilisant,
caractérisée en ce qu'elle comprend en outre :
(b) de 0,01 à 2,5 % en poids d'un second séquestrant des ions Fe(III) choisi parmi

(b) (i) des polymères hydrosolubles comprenant les unités structurales de formule II :

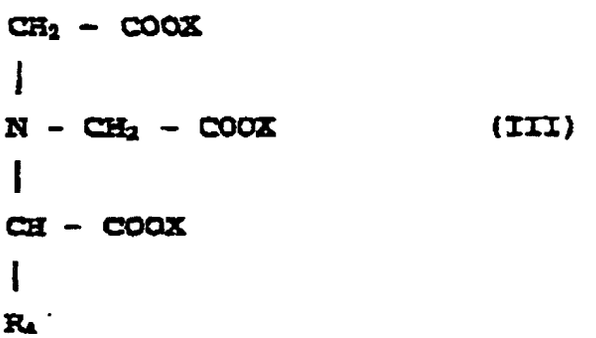


(II)

dans laquelle

R_1 est H ou COOX, de préférence COOX ;
R_2 est H ou CH_2COOX mais R1 et R2 ne peuvent pas être tous les deux H, et R2 est de préférence H ;
R_3 est COOX, OH ou CH_2COOX, de préférence COOX;
et chaque X est individuellement H ou un cation solubilisant ;

(b) (ii) les séquestrants de tensioactif de formule III :



(III)

dans laquelle R_4 est un groupe alkyle en C_8 à C_{18}, de préférence un groupe alkyle en C_{12} à C_{14}, et chaque X individuellement est H ou un cation solubilisant ;
et
(b) (iii) les composés de formule IV :

$$HO - CH_2 - (CH\text{-}OH)_5 - COOX \quad (IV)$$

dans laquelle X est H ou un cation solubilisant.

2. Composition détergente selon la revendication 1, **caractérisée en ce que** le premier séquestrant (a) est l'iminodisuccinate ou l'hydroxyiminodisuccinate.

3. Composition détergente selon la revendication 1 ou la revendication 2, **caractérisée en ce que** le premier séquestrant (a) est présent en une quantité de 0,1 à 2,0 % en poids de la composition.

4. Composition détergente selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le second séquestrant (b) est un polymère hydrosoluble (b) (i) comprenant au moins 15 % en moles, de préférence au moins 20 % en moles, d'unités structurales de formule II.

5. Composition détergente selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le second séquestrant est un polymère hydrosoluble (b) (i) qui est un copolymère comprenant en outre les unités structurales d'un acide monocarboxylique insaturé et/ou d'un acide dicarboxylique insaturé.

6. Composition détergente selon la revendication 5, **caractérisée en ce que** le polymère (b) (i) est un copolymère comprenant :

de 15 à 50 % en moles, de préférence de 20 à 30 % en moles, d'unités structurales de formule II,
de 50 à 85 % en moles, de préférence de 60 à 80 % en moles, d'unités structurales d'acide acrylique,
et éventuellement de 0 à 15 % en moles, de préférence de 1 à 10 % en moles, d'unités structurales d'acide maléique.

7. Composition détergente selon l'une quelconque des revendications 4 à 6, **caractérisée en ce que** le polymère (b) (i) a une masse moléculaire moyenne en poids dans la plage de 1000 à 100000, de préférence de 2000 à 10000.

8. Composition détergente selon l'une quelconque des revendications 4 à 7, **caractérisée en ce que** le polymère (b) (i) est présent en une quantité de 0,01 à 2 % en poids, de préférence de 0,02 à 1 % en poids, davantage de préférence de 0,02 à 0,5 % en poids, sur la base de la composition.

9. Composition détergente selon l'une quelconque des revendications 1 à 3, **caractérisée en ce que** le second séquestrant (b) est un séquestrant de tensioactif (b) (ii) présent en une quantité de 0,05 à 2,5 % en poids, de préférence de 0,1 à 2,0 % en poids, de la composition.

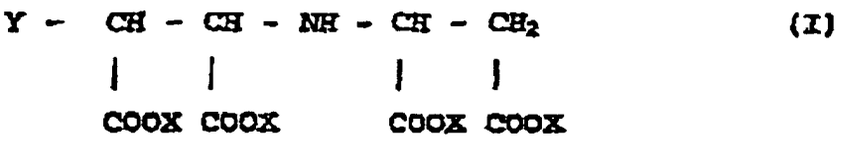
10. Composition détergente selon l'une quelconque des revendications 1 à 3, **caractérisée en ce que** le second séquestrant est un composé de formule IV (b) (iii) présent en une quantité de 0,01 à 2 % en poids, de préférence de 0,02 à 1 % en poids, plus préférablement de 0,02 à 0,5 % en poids, sur la base de la composition.

11. Composition détergente selon l'une quelconque des précédentes revendications, **caractérisée en ce qu'**elle comprend de 5 à 60 % en poids d'un ou plusieurs tensioactifs de détergent et de 10 à 80 % en poids d'un ou plusieurs adjuvants de détergence.

12. Composition détergente selon l'une quelconque des précédentes revendications, qui est essentiellement sans ingrédients décolorants.

13. Procédé de protection de tissus neufs en textile blanc ou légèrement coloré de la dégradation de la couleur au cours du blanchissage, **caractérisé en ce qu'**il comprend le blanchissage des tissus à la main ou à la machine dans une liqueur de lavage contenant une composition détergente telle que revendiquée dans l'une quelconque des revendications 1 à 12.

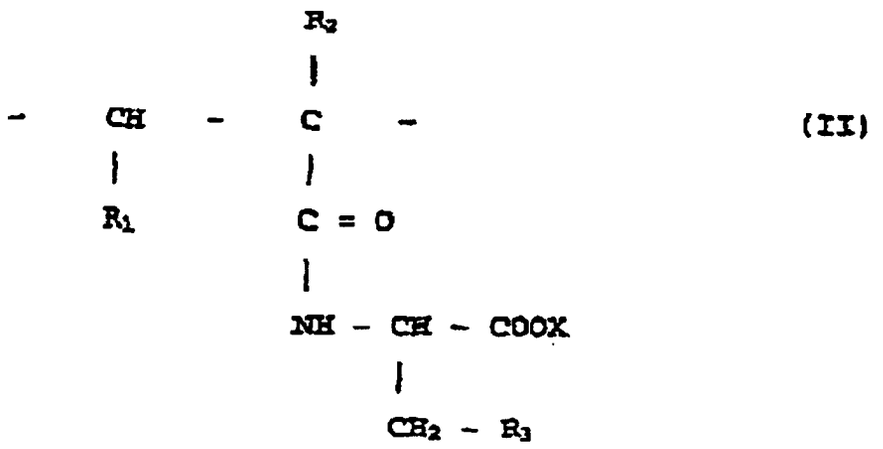
14. Utilisation d'un composé de formule I :



(I)

dans laquelle Y est H ou OH, et chaque X est individuellement H ou un cation solubilisant, en combinaison avec un second séquestrant pour les ions Fe (III) , choisi parmi

(i) les polymères hydrosolubles comprenant les unités structurales de formule II :

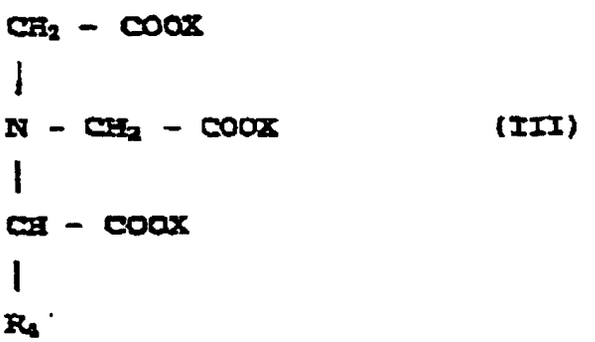


(II)

dans laquelle

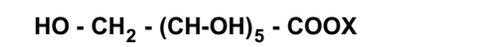
R_1 est H ou COOX, de préférence COOX ;
R_2 est H ou CH_2COOX mais R_1 et R_2 ne peuvent pas être tous les deux H, et R_2 est de préférence H ;
R_3 est COOX, OH ou CH_2COOX, de préférence COOX ;
et chaque X est individuellement H ou un cation solubilisant ;

(ii) les séquestrants de tensioactif de formule III :



(III)

dans laquelle R_4 est un groupe alkyle en C_8 à C_{18}, de préférence un groupe alkyle en C_{12} à C_{14}, et chaque X individuellement est H ou un cation solubilisant ; et
(iii) les composés de formule IV :



(IV)

dans laquelle X est H ou un cation solubilisant ;

dans une composition détergente pour linge pour protéger les tissus neufs en textile blanc ou légèrement coloré de la dégradation de la couleur au cours du blanchissage.