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(54) **DETERGENT COMPOSITIONS**

WASCHMITTEL

COMPOSITIONS DETERGENTES

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WO-A-96/11252 **GB-A- 2 068 405**

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EP 1 240 296 B1

DescriptionTECHNICAL FIELD

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

BACKGROUND AND PRIOR ART

[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] It has now been found that significantly improved maintenance of whiteness or colour fidelity may be observed if a glucoheptonate is incorporated at low levels in a laundry detergent composition.

[0004] Magnesium glucoheptonate as a laundry detergent ingredient is disclosed in GB 2 016 540A (Rhône-Poulenc).

[0005] Other documents disclosing glucoheptonate in laundry detergent compositions are GB 2 068 405A (Sandoz) and US 4 388 205 (Sandoz).

[0006] Peroxyacid bleach particles containing glucoheptonate are disclosed in WO 96 11252A (Eka Nobel AB).

[0007] 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) and GB 2 068 405A (Sandoz).

DEFINITION OF THE INVENTION

[0008] The present invention provides a laundry detergent composition comprising surfactant, builder, and optionally other non-bleach detergent ingredients, which is substantially free of bleach ingredients and also contains from 0.01 to 2.0 wt% of a compound of the formula I



wherein X is H or a solubilising cation.

[0009] 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.

[0010] 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

[0011] The compositions of the invention contain as an essential ingredient a low level of a glucoheptonate of the formula I given above, preferably sodium glucoheptonate.

[0012] The glucoheptonate may suitably be present in the composition in the invention in an amount of from 0.01 to 1.0 wt%, preferably from 0.02 to 0.5 wt%, more preferably from 0.05 to 0.2 wt%.

[0013] Glucoheptonate is effective at very low concentration levels in the composition. No additional benefit is seen at higher concentration levels, for example, above 2 wt%. The amount of glucoheptonate present is preferably below 0.5 wt%.

Detergent compositions

[0014] 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.

[0015] 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 polymeric sequestrant, and optionally other detergent ingredients to 100 wt%.

[0016] According to the invention, the compositions of the invention are substantially free of bleaching ingredients.

[0017] The detergent composition of the invention is preferably in particulate form. Especially preferred are powders and tablets. However, liquid compositions are also within the scope of the invention.

5 Detergent ingredients

[0018] 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.

10 **[0019]** 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.

[0020] The preferred detergent active compounds that can be used are soaps and synthetic non-soap anionic and nonionic compounds.

15 **[0021]** 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 C₈-C₁₅; primary and secondary alkylsulphates, particularly C₈-C₁₅ primary alkyl sulphates; alkyl ether sulphates; olefin sulphonates; alkyl xylene sulphonates; dialkyl sulphosuccinates; and fatty acid ester sulphonates. Sodium salts are generally preferred.

20 **[0022]** Nonionic surfactants that may be used include the primary and secondary alcohol ethoxylates, especially the C₈-C₂₀ aliphatic alcohols ethoxylated with an average of from 1 to 20 moles of ethylene oxide per mole of alcohol, and more especially the C₁₀-C₁₅ 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).

25 **[0023]** Cationic surfactants that may be used include quaternary ammonium salts of the general formula R₁R₂R₃R₄N⁺ 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 R₁ is a C₈-C₂₂ alkyl group, preferably a C₈-C₁₀ or C₁₂-C₁₄ alkyl group, R₂ is a methyl group, and R₃ and R₄, which may be the same or different, are methyl or hydroxyethyl groups); and cationic esters (for example, choline esters).

[0024] In an especially preferred cationic surfactant of the general formula R₁R₂R₃R₄N⁺ X⁻, R₁ represents a C₈-C₁₀ or C₁₂-C₁₄ alkyl group, R₂ and R₃ represent methyl groups, and R₄ presents a hydroxyethyl group.

30 **[0025]** Amphoteric surfactants, for example, amine oxides, and zwitterionic surfactants, for example, betaines, may also be present.

[0026] 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.

[0027] Nonionic surfactant, if present, is preferably used in an amount within the range of from 1 to 20% by weight.

35 **[0028]** The total amount of surfactant present is preferably within the range of from 5 to 60 wt%.

[0029] 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.

[0030] The detergent compositions may contain as builder a crystalline aluminosilicate, preferably an alkali metal aluminosilicate, more preferably a sodium aluminosilicate (zeolite).

40 **[0031]** 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. 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.

[0032] 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.

50 **[0033]** Other inorganic builders that may be present additionally or alternatively include sodium carbonate, layered silicate, amorphous aluminosilicates.

[0034] 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.

55 **[0035]** 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 %. Builders, both inorganic and organic, are preferably

present in alkali metal salt, especially sodium salt, form.

[0036] 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.

[0037] 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.

[0038] Other enzymes that may suitably be present include lipases, amylases, and cellulases including high-activity cellulases such as "Carezyme").

[0039] 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.

[0040] Antiredeposition agents, for example cellulose esters and ethers, for example sodium carboxymethyl cellulose, may also be present.

[0041] 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.

[0042] Especially preferred soil release polymers are the sulphonated non-end-capped polyesters described and claimed in WO 95 32997A (Phodia Chimie).

[0043] 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

[0044] 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.

[0045] According to one especially preferred embodiment of the invention, the detergent composition is in particulate form. If necessary, the glucoheptonate may be incorporated in particulate compositions in the form of granules containing an inert carrier material.

[0046] 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 glucoheptonate may be either incorporated via the slurry or post-dosed. "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.

[0047] 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 requisite concentrations.

EXAMPLES

[0048] 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. In the Examples the following abbreviations are used:

EDDS Ethylenediamine disuccinate, sodium salt

EDTMP Ethylenediamine tetramethylene phosphonate, Ca salt: Dequest (Trade Mark) 2047 ex Monsanto

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

[0049] In this experiment, the effectiveness of sodium glucoheptonate in preventing the discolouration of white cotton

fabric was compared with that of two known sequestrants, EDTMP (Dequest 2047) and EDDS. The experimental procedure was as follows.

[0050] The sequestrants, in the concentrations indicated below, were added to 1 litre of demineralised water containing iron(III) chloride in an amount sufficient to give a Fe(III) concentration of 10 ppm, in a tergotometer pot. 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.

[0051] The ideal here is for a result as close as possible to zero, indicating no deposition of iron and no visible deterioration in appearance.

[0052] The concentrations for the sequestrants were chosen as follows:

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

0.002 g/l, equivalent to 0.05 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.

[0053] Average changes in reflectance are shown in the following Table.

Example	Sequestrant	Concentration Equivalent (wt%)	Average ΔR 420 nm
A	EDTMP	0.20	+ 0.01
B	EDTMP	0.05	- 3.27
C	EDTMP	0.02	-25.59
D	EDDS	0.20	-32.02
1	Na glucoheptonate	0.20	+ 0.01
2	Na glucoheptonate	0.05	+ 1.72
3	Na glucoheptonate	0.02	-16.95

[0054] EDTMP is an excellent sequestrant but has come under some scrutiny on environmental grounds because of its phosphorus content. EDDS has been widely proposed as a zero-phosphorus replacement.

[0055] It will be seen that sodium glucoheptonate provides a phosphorus-free alternative to EDTMP that is substantially superior to EDDS.

EXAMPLES 4 to 9

Detergent compositions

Example 4 - spray-dried detergent powder

[0056]

	wt%
Sodium linear alkylbenzene sulphonate (NaLAS)	22.92
Sodium silicate (anhydrous)	4.67
Sodium tripolyphosphate	18.67
Sodium carboxymethyl cellulose	0.25
Polyacrylate polymer	0.70

EP 1 240 296 B1

(continued)

	wt%
Calcite	10.00
Na glucoheptonate	0.02-1.0, preferably 0.05-0.2
Sodium sulphate, water, impurities	to 100

Examples 5 to 7: concentrated detergent powders

[0057]

	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
Acrylate/maleate copolymer		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
Na glucoheptonate	0.02-1.0, preferably 0.05-0.2	0.02-1.0, preferably 0.05-0.2	0.02-1.0, preferably 0.05-0.2
Fluorescer, perfume, speckles, water	to 100	to 100	to 100

Examples 8 and 9: liquid detergent compositions

[0058]

	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 ₂ O)	2.50	
Na tetraborate		4.00
Boric acid	0.50	
Glycerine CP		6.00
Acrylate/maleate copolymer		0.12

(continued)

	8	9
Preservatives	0.08	
Blue dye	0.02	
Na glucoheptonate	0.02-1.0, preferably 0.05-0.2	0.02-1.0, preferably 0.05-0.2
Perfume	0.15	0.40
Water	to 100	to 100

Claims

1. A laundry detergent composition comprising surfactant, builder, and optionally other non-bleach detergent ingredients, **characterised in that** it is substantially free of bleach ingredients and it also contains from 0.01 to 2.0 wt% of a compound of the formula I



wherein X is H or a solubilising cation.

2. A detergent composition as claimed in claim 1, **characterised in that** in the formula I X is an alkali metal, preferably sodium.
3. A detergent composition as claimed in claim 1 or claim 2, **characterised in that** the compound of the formula I is present in an amount of from 0.01 to 1.0 wt%, preferably from 0.02 to 0.5 wt%, more preferably from 0.05 to 0.2 wt%.
4. A detergent composition as claimed in any preceding claim, **characterised in that** the compound of the formula I is present in an amount of less than 0.5 wt% based on the composition.
5. A detergent composition as claimed in any preceding claim, which comprises from 5 to 60 wt% of one or more detergent surfactants and from 10 to 80 wt% of one or more detergency builders.
6. A detergent composition as claimed in any preceding claim, which is in particulate form.
7. 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 claimed in any preceding claim.

Patentansprüche

1. Waschmittelzusammensetzung, umfassend ein oberflächenaktives Mittel, einen Aufbaustoff und gegebenenfalls andere Nicht-Bleichmittel-Waschmittelinhaltsstoffe, **dadurch gekennzeichnet, daß** sie im wesentlichen frei ist von Bleichmittelinhaltsstoffen und ebenso 0,01 bis 2,0 Gew.-% einer Verbindung der Formel I



worin X H oder ein löslichmachendes Kation ist, enthält.

2. Waschmittelzusammensetzung nach Anspruch 1, **dadurch gekennzeichnet, daß** in Formel I X ein Alkalimetall, vorzugsweise Natrium ist.

3. Waschmittelzusammensetzung nach Anspruch 1 oder Anspruch 2, **dadurch gekennzeichnet, daß** die Verbindung der Formel I in einer Menge von 0,01 bis 1,0 Gew.-%, bevorzugt 0,02 bis 0,5 Gew.-% stärker bevorzugt 0,05 bis 0,2 Gew.-% vorliegt.
4. Waschmittelzusammensetzung nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, daß** die Verbindung der Formel I in einer Menge von weniger als 0,5 Gew.-%, basierend auf der Zusammensetzung, vorliegt.
5. Waschmittelzusammensetzung nach einem der vorherigen Ansprüche, die 5 bis 60 Gew.-% von einem oder mehreren oberflächenaktiven Waschmitteln und 10 bis 80 Gew.-% von einem oder mehreren Aufbaustoffen umfaßt.
6. Waschmittelzusammensetzung nach einem der vorherigen Ansprüche, die in partikulärer Form vorliegt.
7. Verfahren zum Schutz von neuen weißen oder hellfarbigen Textilgeweben vor der Farbverschlechterung beim Waschen, das das Waschen der Gewebe per Hand oder einer Maschine in einer Waschflüssigkeit umfaßt, die eine Waschmittelzusammensetzung nach einem der vorhergehenden Ansprüche enthält.

Revendications

1. Composition détergente pour lessive comprenant un surfactant, un adjuvant, et facultativement d'autres ingrédients détergents qui ne sont pas des ingrédients de blanchiment, **caractérisée en ce qu'elle** est essentiellement dépourvue d'ingrédients de blanchiment et **en ce qu'elle** contient aussi de 0,01 à 2,0 % en poids d'un composé de formule I :



dans laquelle X est H ou un cation solubilisant.

2. Composition détergente selon la revendication 1, **caractérisée en ce que** dans la formule I X est un métal alcalin, de préférence le sodium.
3. Composition détergente selon la revendication 1 ou la revendication 2, **caractérisée en ce que** le composé de formule I est présent en une quantité comprise entre 0,01 et 1,0 % en poids, de préférence entre 0,02 et 0,5 % en poids, de manière davantage préférée entre 0,05 et 0,2 % en poids.
4. Composition détergente selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le composé de formule I est présent en une quantité inférieure à 0,5 % en poids en se basant sur la composition.
5. Composition détergente selon l'une quelconque des revendications précédentes, qui comprend de 5 à 60 % en poids d'un ou plusieurs surfactants détergents et de 10 à 80 % en poids d'un ou plusieurs adjuvants de détergence.
6. Composition détergente selon l'une quelconque des revendications précédentes, qui est sous une forme particulière.
7. Procédé de protection de nouveaux tissus textiles blancs ou de couleur claire de la dégradation des couleurs lors du lavage, qui comprend le lavage des tissus à la main ou à la machine dans une lessive contenant une composition détergente telle que définie dans l'une quelconque des revendications précédentes.