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(54) **Detergent composition containing low levels of amine oxides.**

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US-A-3 202 714
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US-A-4 065 409
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Description

Technical Field

This invention relates to detergent compositions containing low levels of amine oxides. These amine oxides are substituted by at least one long chain alkyl or alkenyl group. Preferred amine oxides have at least two alkyl, especially methyl, or two alkylene oxide, especially ethylene oxide, groups attached to the nitrogen atom(s). These compositions produce an alkaline laundry liquor pH. These compositions exhibit a breed range of remarkable textile treatment benefits, particularly enhanced soil release and cleaning properties.

There is a standing desire to improve textile cleaning and confer further textile benefits through either the laundry treatment or via the subsequent use, vs. the laundry treatment, of an additive e.g. during the rinse.

U.S. Patent 3 985 923, Basadur, issued October 12, 1976, relates to the application of renewable soil release finish during the rinsing step from a dilute aqueous acidic solution. The release agent is a copolymer based on a dibasic carboxylic acid and a glycolic compound.

U.S. Patent 3 962 152, Nicol, Hays, issued June 8, 1976 pertains to the laundry treatment deposition of renewable soil release finish to synthetic treatment fabrics treated therewith. The soil release finish consists of ethylene terephthalate and polyethylene oxide terephthalate.

The performance benefits derived from the utilization of the like additives are premised on the deposition of a releasable coating onto the fiber from the laundry/rinsing step. The coating will be rinsed off during the next laundry cycle, inclusive of the total soil accumulated thereon, to thus provide a "non-alterated" degree of cleaning.

Mono- and polyamine oxides have found widespread application in detergent technology, mostly in a surfactant functionality. Representative of this known state of the art are the following references:

1. Dutch Patent Application 7 204 495, Unilever N.V., relates to alkalimetal carbonate built detergent compositions containing a binary surfactant combination, namely a non-ionic surfactant and a mono amine oxide which are normally used in a ratio of 1 : 3 to 3 : 1. The total level of non-ionic surfactant and amine oxide is in the range from 5 - 25 %.

2. British Patent 1 007 343, The Procter & Gamble Company, relates to surface-active diamine dioxydes and compositions composed thereof. These diamine dioxydes are used in conventional "surface-active" levels, i.e., at least 5 % by weight of the finished detergent compositions.

3. U.S. Patent 3 531 526, The Procter & Gamble Company, pertains to detergent diamine dioxides, prepared by oxidation of the corresponding diamines. These oxides are used in detergents in levels from 5 - 50 %.

4. U.S. Patent 4 133 779, The Procter & Gamble Company, relates to detergent compositions containing a semi-polar nonionic e.g. an amine oxide, in combination with an alkaline earth metal of an anionic detergent. These compositions exhibit a neutral to slightly alkaline pH. Exemplified levels of an amine oxide in granular detergents range from 1 - 15 %.

5. U.S. Patent 3 202 714, The Procter & Gamble Company, pertains to oxy-containing tertiary amine detergents and detergent compositions containing them. These oxides are used in granular and liquid detergents in levels frequently exceeding 10 %.

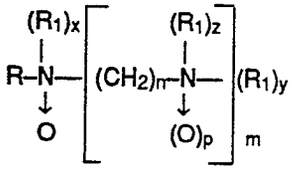
The total prior art refers to the utilization of mostly monoamine oxides in a conventional detergent functionality. It is widely recognized that such aminoxides are good surfactants and indeed have been utilized in commercial detergent executions. However, the art is not suggestive of incidental textile benefits derivable from utilizing unexpectedly low levels of the very components in a non-surfactant functionality.

It is a object of the present invention to provide detergent compositions containing a surface-active agent a peroxybleach compound, a detergent builder and low levels of amine oxides; these compositions are capable of providing a broad range of textile treatment benefits, particularly enhanced soil release and cleaning properties.

Summary of the Invention

The present invention comprises particulate built detergent compositions having enhanced soil release and cleaning properties containing:

(a) from 5 - 25 % by weight of a surfactant
(b) from 0.25 % - 0.75 % by weight of an amine oxide having the formula



wherein

R is an alkyl or alkenylgroup having 10 to 22 carbon atoms, the R'$_1$s which are identical or different are selected from C_{1-4} alkyl, ethylene oxide and propylene oxide,
n is an integer from 1 to 6,
m is an integer from 0 to 6,
p is 0 or 1,
x, y and z are each 1 for alkylsubstituents and integers in the range from 1 to 10 for ethylene oxide or propylene oxide substituents such that the sum of (x+y+z) is not greater than 25.

(c) from 3 % to 50 % by weight of a peroxybleach compound and
(d) from 10 % to 45 % by weight of a detergent builder; whereby a 1 % aqueous solution of the composition has an alkaline pH (20°C) and wherein the surfactant consists of anionic surfactant.

The compositions herein have an alkaline pH in the range from 8.5 - 11 (1 % aqueous solution 20°C). Preferred are granular compositions wherein the builder system is comprised of a water-soluble detergent builder or a water-insoluble aluminosilicate detergent builder or a mixture thereof.

Detailed Description of the Invention

The detergent compositions of the present invention are defined in five essential parameters:

(a) anionic surface-active agent;
(b) an amine oxide;
(c) a peroxybleach compound
(d) a detergent builder, and
(e) have an alkaline pH in 1 % aqueous solution at 20°C.

Optional ingredients can be added to provide various performance and aesthetic benefits.
Unless indicated to the contrary, the "percent" indications hereinafter stand for "percent by weight".

Surface-Active Agent

The detergent compositions herein comprise as a first essential component, anionic surface-active agent.

The anionic surface-active agent represents from 5 % to 25 %, preferably from 5 % to 20 %.

Suitable anionic detergents include ordinary alkali metal soaps of higher fatty acids containing from about eight to 24 carbon atoms and preferably from 10 to 20 carbon atoms.

Alkyl sulfonated or sulfated surfactants inclusive of alkyl benzene sulfonates, in which the alkyl group contains from 9 to 20 carbon atoms in straight-chain or branched-chain configuration, e.g., those of the type described in U.S. Patent No. 2 220 099 and 2 477 383 (especially valuable are linear straight chain alkyl benzene sulfonates in which the average of the alkyl groups is about 11.8 carbon atoms and commonly abbreviated as $C_{11.8}$ LAS); sodium alkyl glyceryl ether sulfonates, especially those ethers of higher alcohols derived from tallow and coconut oil; sodium coconut oil fatty acid monoglyceride sulfonates and sulfates also represent a class of very useful anionic surface-active agents.

Useful in this invention are also salts of 2-acyloxyalkane-1-sulfonic acids.

Typical examples of the 2-acyloxy-alkanesulfonates are described in Belgium Patent No. 650 323 issued July 9, 1963, U.S. Patent Nos. 2 094 451 issued September 28, 1937 to Guenther et al., and 2 086 215 issued July 6, 1937 to DeGroote.

β-alkoxy alkane sulphonates can also be used. Specific examples of β-alkyloxy alkane sulfonates having low hardness (calcium ion) sensitivity useful herein to provide superior cleaning levels under household washing conditions include: potassium-β-methoxydecanesulfonate, sodium 2-methoxytridecanesulfonate, potassium 2-ethoxytetradecylsulfonate, and sodium 2-isopropoxyhexadecylsulfonate.

Paraffin sulfonates containing a straight or branched chain, saturated aliphatic hydrocarbon radical having from 8 to 24, preferably 12 to 18, carbon atoms can also be used.

Other synthetic anionic detergents useful herein are alkyl ether sulfates. These materials have the formula

$$RO(C_2H_4O)_xSO_3M$$

wherein
R is alkyl or alkenyl of about 10 to about 20 carbon atoms,
x is 1 to 30, and
M is a water-soluble cation.

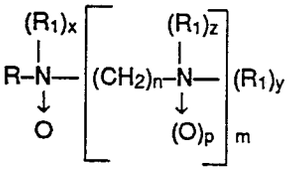
Suitable examples of alkyl ether sulfates are those comprising a mixture of individual compounds, said mixture having an average alkyl chain length of from 12 to 16 carbon atoms and an average degree of ethoxylation of from 1 to 4 moles of ethylene oxide. Such a mixture also comprises from 0 to 20 % by weight C_{12-13} compounds; from 60 to 100 % by weight of $C_{14-15-16}$ compounds; form 0 to 20 % by weight of $C_{17-18-19}$ compounds; from 3 to 30 % by weight of

compounds having a degree of ethoxylation of 0; from 45 to 90 % by weight of compounds having a degree of ethoxylation of from 1 to 4; from 10 to 25 % by weight of compounds having a degree of ethoxylation of from 4 to 8; and from 0.1 to 15 % by weight of compounds having a degree of ethoxylation greater than 8.

α-Olefin sulfonate mixtures as described in U.S. Patent No. 3 332 880, issued July 25, 1967, can also be used.

The Amine Oxide

A second essential component in the compositions herein is represented by an amine oxide having the formula



wherein

R is an alkyl or alkenylgroup having 10 to 22 carbon atoms, the R_1's which are identical or different are selected from C_{1-4} alkyl, ethylene oxide and propylene oxide,

n is an integer from 1 to 6,

m is an integer from 0 to 6,

p is 0 or 1,

x, y, and z are each 1 for alkylsubstituents, and integers in the range from 1 to 10 for ethylene oxide or propylene oxide substituents such that the sum of (x+y+z) is not greater than 25.

This amine oxide component is used in a level from 0.25 % to 0.75 %. Utilizing less than the minimum levels will not provide anymore the inventive benefits, whereas levels above the specified definition will not yield anymore performance advantages but rather unexpectedly causes noticeable cleaning performance negatives, particularly whiteness deficiencies.

Suitable species of the amine oxide component for use herein correspond to the general formula above wherein the individual substituents can be varied as follows:

R: tallow C_{16-18} alkyl; coconut C_{12-14} alkyl; lauryl; palmityl; stearyl; oleyl.
R_1: ethylene oxide; propylene oxide; methyl; ethyl.
n: 2, 3, 4.
m: 0, 1, or 2.
x, y, and 2 are each 1, 2, 3 or 4 and their sum is from 2 to 18.

Preferred amine oxides for use herein are defined by the following substituents:
R: C_{12-18} alkyl.
R_1: ethylene oxide; methyl.
m: 0 or 1;
n: 3 (assuming m is different from 0).
x, y, z are each at least 1 and their sum is in the range from 2 to 12, for example 2, 3,7 and 12.

One particularly preferred class of amine oxide species is represented by mono-amine oxides having the following substituents.

m: 0.
R_1: methyl; ethyl; ethylene oxide.
R: coconut C_{12-14} alkyl.
x and y are both 1.

A specific example of this preferred class of mono-amine oxides is: N-C_{12}-C_{14} coconut alkyl-N,N-dimethyl amine oxide.

Another particularly preferred class of amine oxide species is represented by bisamine oxides having the following substituents.

m: 1.
R: tallow C_{16}-C_{18} alkyl; palmityl; oleyl; stearyl.
R_1: ethylene oxide.
n: 2 or 3.
x, y, and z are each at least 1, and their sum is from 3 to 12.

A specific example of this preferred class of bis-amine oxides is: N-hydrogenated C_{16}-C_{18} tallow alkyl-N,N',N'-tri-(droxyethyl)-propylene-1,3-diamine oxide.

Alkaline Solution

The compositions herein shall yield upon dissolution in water an alkaline laundry liquor. A 1 % aqueous solution of granular detergent compositions shall have an alkaline pH in the range from 8.5 to 11, measured at 20°C. The pH can be adjusted by known means inclusive of alkaline buffer substances such as alkali hydroxides, ammonium hydroxide, amines and substituted amines, such as mono-, di- and triethanolamines; alkaline builder substances such as alkalimetal carbonates, alkalimetal phosphates and polyphosphates, citric acid and alkalimetal silicates. The proper choice of suitable pH adjusting agents shall of course take into account the relative compatibility of the additional ingredients of a particular composition. Such ingredient optimization and selection are well-known routine measures, however.

Detergent Builder

The detergent compositions of this invention further contain a detergent builder in a level from 10 % to 45 %. The builder component can be represented by all known water-soluble and water-insoluble detergent builder ingredients.

Non-limiting examples of suitable water-soluble, inorganic alkaline builder salts include the alkali metal carbonates, borates, phosphates, polyphosphates, tripolyphosphates, bicarbonates, silicates, and sulfates. Specific examples of such salts include the sodium and potassium tetraborates, bicarbonates, carbonates, tripolyphosphates, pyrophosphates, and hexametaphosphates.

Examples of suitable organic alkaline detergency builder salts are:

(1) water-soluble amino polyacetates. e.g. sodium and potassium ethylene diamine tetra-acetates, nitrilotriacetates, and N-(2-hydroxyethyl)nitrilodiacetates;

(2) water-soluble salts of phytic acid, e.g. sodium and potassium phytates:

(3) water-soluble polyphosphonates, including sodium, potassium and lithium salts of ethane-1-hydroxy-1,1-diphosphonic acid; sodium, potassium, and lithium salts of methylenediphosphonic acid and the like. Additional organic builder salts useful herein include the polycarboxylate materials described in U.S. Patent No. 2 264 103, including the water-soluble alkali metal salts of mellitic acid.

The water-soluble salts of polycarboxylate polymers and copolymers such as are described in U.S. Patent No. 3 308 067 are also suitable herein.

It is to be understood that while the alkali metal salts of the foregoing inorganic and organic polyvalent anionic builder salts are preferred for use herein from an economic standpoint, the ammonium, alkanolammonium (e.g. triethanolammonium, diethanolammonium and monoethanolammonium) and other water-soluble salts of any of the foregoing builder anions can be used.

Mixtures of organic and/or inorganic builders can be used herein. One such mixture of builders is disclosed in Canadian Patent No. 755 038, e.g., a ternary mixture of sodium tripolyphosphate, trisodium nitrilotriacetate, and trisodium ethane-1-hydroxy-1,1-diphosphonate.

Another type of detergency builder material useful in the present invention comprises a water-soluble material capable of forming a water-insoluble reaction product with water hardness cations, preferably in combination with a crystallization seed which is capable of providing growth sites for said reaction product. Specific examples of materials capable of forming the water-insoluble reaction product include the water-soluble salts of carbonates, bicarbonates, sesquicarbonates, silicates, aluminates and oxalates. The alkali metal, especially sodium, salts of the foregoing materials are preferred for convenience and economy. Preferred crystallization seed materials are calcium carbonate, calcium oxide and calcium hydroxide. Such "seeded builder" compositions are fully disclosed in British Patent Specification No. 1 424 406.

Non-seeded precipitating builder systems employing pyrophosphates or mixtures thereof with orthophosphates are also useful herein. Precipitating pyrophosphate and orthopyrophosphate builder systems are disclosed in DE-A-2 542 704 and 2 605 052 published April 15 and August 16, 1976, respectively.

Suitable examples of water-insoluble detergent builders are selected from the group consisting of zeolites A, X, or P(B), or mixtures thereof, having a particle size diameter of from 0.01 micrometer to 25 micrometers and containing at least 10 % water of hydration, and amorphous hydrate aluminosilicate material of the empirical formula:

$$M_2(zAlO_2 \cdot ySiO_2)$$

wherein

M is sodium, potassium ammonium,

Z is from about 0.5 to about 2,

y is 1,

said materials having a particle size diameter of less than 100 micrometers, a magnesium ion exchange capacity of at least about 50 milligrams equivalents of $CaCO_3$ hardness per gram of ahydrous aluminosilicate, and a Mg^{++} exchange rate of at least 0.0045 g/l/min/l (1 grain/gallon/minute/gram/gallon) and mixtures thereof.

The preferred synthetic crystalline aluminosilicate materials for use herein commonly known as Zeolites A, X, and P(B) should contain at least 10 % water of hydration and should have a particle size diameter of from 0.5 micrometer to 30 micrometers, more preferably from 0.5 micrometer to 10 micrometers. Aluminosilicate materials are more fully described in U.S. Patent 4 096 081, Phenicie et al., issued June 20, 1978, and German Patent No. 2 704 003, Ohren, published on August 18, 1977. The amorphous alumininosilicate materials suitable for use herein are fully described in U.S. Patent No. 4 180 485, Llenado, published December 25, 1979.

The water-insoluble detergent builders are frequently and preferably utilized in the granular compositions herein in conjunction with a water-soluble detergent cobuilder ingredient in a weight ratio of aluminosilicate: water-soluble detergent cobuilder of from 4 : 1 to 1 : 4. Suitable examples of preferred water-soluble co-builder ingredients are represented by the water-soluble salts of nitrilotriacetic acid, polyphosphates e.g. tripolyphosphates, and citrates. The cations of these cobuilders can e.g. be represented by alkalimetal ions, sodium, potassium, lithium, and by organic ions such as amines, substituted amines (alkanolamines) and ammonium ions.

Peroxybleach Compound

The detergent compositions contain a peroxybleach compound in an amount from 3 % to 50 %, preferably from 5 % to 35 %. Suitable peroxybleach compounds are all those which are known to be adapted for use in or have already been used in detergent technology. Examples of such peroxybleaches include the water-soluble alkali salts of perborate mono-hydrate, perborate tetrahydrate, persulfates, persilicates, perphosphates, and percarbonates. Organic oxygen-bleach activators can also advantageously be used in oxygen-bleach containing detergent executions of this invention. Examples of such activators include phthalic anhydride, tetra-acetyl ethylene diamine, tetra-acetyl methylene diamine and tetra-acetyl glycouril. Such activators are frequently used in levels from 0.2 % to 15 %, preferably from 1 % to 4 %. The weight ratios of the peroxybleach compound to the activator is frequently in the range from about 10 : 1 to 2 : 1.

Optional Ingredients

In addition to the components described hereinbefore, the compositions of this invention can comprise a series of supplementary components to perfect and complement the benefits derived from the compositions herein. These additional components include brighteners, dyes, perfumes, bactericides, processing aids, anti-oxidants, corrosion inhibitors, enzymes suds regulants and so on.

It may be desirable to add a copolyer of a

(1) vinyl compound having the general formula RCH=CHR wherein one R represents a hydrogen atom and the other R represents an alkyl radical containing from one to 4 carbon atoms; and

(2) maleic anhydride.

The copolymeric vinyl ingredient is normally used in an amount from 0.1 % to 6 %, preferably from 0.25 % to 4 %. Specific examples of these copolymeric ingredients include a water-soluble acid, an alkali-metal salt of that acid, an ester, or a C_{1-2}alkyl or alkylolamide of a maleic anhydridevinyl C_{1-4} alkyl ether copolymer. The specific viscosity of, for example, the maleic anhydride-vinyl C_{1-4} alkyl ether, preferably methylether, copolymer for use herein normally varies between 0.1 and 6, most preferably between 0.2 and 5.0. The (molecular) monomer ratio (maleic : vinylalkylether) is preferably in the range from 2 : 1 to 1 : 2. The specific viscosity is defined by measuring the viscosity of the solution of 1 g of the anhydride copolymer in 100 ml methylethylketone at 25°C in a series of 100 Cannon-Fenske® viscosity meter. The copolymeric component can serve as slurry processing aid to thus provide a detergent product having improved physical properties including flowability.

Another optional ingredient is a mixture of alkoxylated mono- and diesters of phosphoric acid.

These phosphoric esters are preferably represented by alkoxylated fatty alcohols having from 10 to 22 carbon atoms with 2 to 15 moles ethylene oxide or propylene oxide. The weight ratio of monophosphoric esters to diphosphoric esters is usually in the range from 6 : 1 to 3 : 1, preferably 4 : 1.

It may be desirable, to add to the crutcher an anti-oxidant. Suitable examples of anti-oxidant materials are disclosed in DE-B-1 617 209. A preferred anti-oxidant material is 4,4'-thiobis(6-tert-butyl-m-cresol).

The detergent compositions can additionally contain an enzymatic ingredient. Proteases, amylases and lipases can be added in an amount from 0.001 % to 5 % to augment and aid in the cleaning activity of the detergent compositions herein. Preferred proteolytic enzymes are disclosed in Belgian Patent 775 854, to EYMERY et al., granted May 26, 1972.

The detergent compositions of this invention frequently comprise a suds regulant in a level of 0.01 % - 10 %.

Suitable suds regulants are well-known in detergent technology and most of these can easily be used in combination with the claimed technology.

Conventional detergent suds regulants which can be used include saturated fatty acids especially those hav-

ing 16 to 24 carbon atoms in the alkylchain, non-ionic suds regulants and mixtures thereof. Another class of well-known suds regulants are silicones, preferably silanated silicones in admixture with microcrystalline waxes.

Preferred suds regulants containing a separately processed detergent additive on basis of a water-insoluble liquid hydrocarbon, an adjunct material preferable a solid hydrocarbon, and a hydrophobic silica are described in U.S. Patent 4 192 761, Peltre and Lafleur, issued March 11, 1980. These liquid hydrocarbon-containing regulants are preferably used in granular executions.

The following examples illustrate the invention and facilitate its understanding.

Example I

A detergent composition was prepared having the following formulation:

Ingredients	Composition A	Example (% by weight) I
Linear dodecylbenzene sulfonate sodium salt	5.6	5.6
Tallow alcohol sulfate sodium salt	2.4	2.4
Sodium tripolyphosphate	24.0	24.0
Sodium silicate solids (SiO_2 : Na_2O = 1.6)	6.0	6.0
Carboxymethylcellulose	1.0	1.0
Copolymer of maleic anhydride and methyl vinyl ether	1.0	1.0
Sodium sulfate	18.2	17.85
Moisture	7.0	7.0

A series of spray-drying sensitive ingredients were added to the above base-powder by dry-mixing, namely:

perborate tetrahydrate	32.0	32.0
enzyme	0.3	0.3
minors inclusive of perfume	2.5	2.5
suds regulant particles having the composition of Example I of U.S. Patent 4 192 761	0.3	0.3

0.35 % of N-hydrogenated tallow-N,N',N'-tri-(2-hydroxyethyl)-propylene-1,3-diamine-N-N'-dioxide was sprayed onto the mixture of the base-powder and the spray-drying sensitive ingredients.

The detergent compositions were used for comparative laundry tests in a Miele®W421 washing machine.

Terry, undershirt and muslin cotton tracers were used to measure the comparative whiteness maintenance performance after 4 cumulative cycles.

Testing parameters were: 90°C heat-up cycle; pre-wash step and main-wash step using a product concentration of 0.9 % in city water with an average water hardness of 3 mmoles/1; ratio Ca/Mg = 5 : 1; laundering treatment in presence of 3 kg soiled clothes.

After having been subjected to the above washing treatment (4 cumulative cycles) the dried whiteness maintenance tracers were visually graded by two expert judges thereby using a 0 - 4 scale whereby:

0 = see no difference between the swatches
1 = believe there is a difference between the swatches
2 = there is a difference between the swatches
3 = am sure there is a difference between the swatches
4 = very important difference between the swatches.

The whiteness maintenance readings were pooled and averaged on 4 replicates with the following results. The swatches treated with composition A were used for reference purposes:

Tracer	Example I
Terry	+ 1.3
Undershirt	+ 1.0
Muslin	+ 1.0

+ means that example I is preferred over composition A.

These testing results confirm the consistent superiority of example I in accordance with this invention versus prior art composition A.

Substantially identical results are obtained from the compositions of example I wherein the tallowdiaminedioxide is substituted by an equivalent level of: N-C_{12-14}-alkyl-N,N',N'-tri-(2-hydroxyethyl)-propylene-1,3-diamine-N,N'-di

oxide; N-palmityl-N,N',N'-hepta-(2-hydroxyethyl)-ethylene-1,2-diamine-N,N'-dioxide; N-C_{16-18}-tallowalkyl-N,N-dimethyl-N-amine oxide; N-C_{12-14}-coconut alkyl-N,N-di-(2-hydroxyethyl)-N-amine oxide; or N-C_{16-18}-tallowalkyl-N,N-di-(2-hydroxyethyl)-N-amine oxide.

Example II

A detergent composition was prepared having the following composition:

Ingredients	Composition A	Example II
Linear dodecylbenzene sulfonate sodium salt	5.6	5.6
Tallow alcohol sulfate sodium salt	2.4	2.4
Sodium tripolyphosphate	24.0	24.0
Sodium silicate solids (SiO_2 : Na_2O = 1.6)	6.0	6.0
Carboxymethylcellulose	1.0	1.0
Copolymer of maleic anhydride and methyl vinyl ether	1.0	1.0
Sodium sulfate	18.2	17.85
Moisture	7.0	7.0
C_{12}-C_{14} alkyl dimethylamine oxide	-	0.35
Perborate tetrahydrate	32.0	32.0
Enzyme	0.3	0.3
Minors inclusive of perfume	2.5	2.5

The amine oxide was incorporated into the crutcher. The spray-drying sensitive were added to the base-powder by dry-mixing.

Testing conditions were identical to those described in Example I hereinbefore.

Whiteness maintenance readings were pooled and averaged on 4 replicates with the following results. Swatches treated with composition. A were used for reference purpose.

Tracer	Example I
Terry	+ 1.00
Undershirt	+ 0.80

Example III

Detergent compositions were prepared by using the di-aminedioxide of Example I in accordance with the technique set forth in that example:

Ingredients	Example III	Composition C
Diamine-dioxide	0.35	2.00
Linear dodecylbenzene sulfonate sodium salt	5.6	5.6
Tallow alcohol sulfate sodium salt	2.4	2.4
Sodium tripolyphosphate	24.0	24.0
Sodium silicate solids (SiO_2 : Na_2O = 1.6)	6.0	6.0
Carboxymethylcellulose	1.0	1.0
Copolymer of maleic anhydride and methyl vinyl ether	1.0	1.0
Perborate tetrahydrate	32.0	32.0
Enzyme	0.3	0.3
Minors inclusive of perfume	2.5	2.5
Sodium sulfate, moisture		

Testing conditions were identical to those described in Example I hereinbefore.

Whiteness maintenance readings were pooled and averaged on 4 replicates with the following results. Swatches treated with the Composition of example I were used for reference purpose.

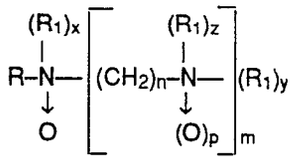
Tracer	Composition C
Terry	- 3.00
Undershirt	- 3.20
Muslin	- 2.00

These comparative results confirm the performance superiority and level criticality of a detergent composition containing the claimed amine-dioxides.

Claims

1. A particulate detergent composition having enhanced soil release and cleaning properties comprising:

(a) from 5 % to 25 % by weight of surface-active agent;
(b) from 0.25 % to 0.75 % by weight of an amine oxide having the formula



wherein
R is an alkyl or alkenylgroup having 10 to 22 carbon atoms, the R_1's which are identical or different are selected from C_{1-4} alkyl, ethylene oxide and propylene oxide,
n is an integer from 1 to 6,
m is an integer from 0 to 6, p is 0 or 1,
x, y, and z are each 1 for alkylsubstituents, and integers in the range from 1 to 10 for ethylene oxide or propylene oxide substituents such that the sum of (x+y+z) is not greater than 25.
(c) from 3 % to 50 % by weight of a peroxybleach compound; and
(d) from 10 % to 45 % by weight of a detergent builder; whereby a 1 % aqueous solution of the composition, measured at 20°C has a pH in the range from 8.5 to 11 and wherein the surface-active agent consists of anionic surfactant.

2. The detergent composition in accordance with claim 1 which in addition contains from 0.01 % to 10 % by weight of a detergent suds regulant.

3. The detergent composition in accordance with claim 1 wherein the detergent builder is a mixture of:

(i) a water-soluble detergent builder selected from the group consisting of the water-soluble salts of nitrilotriacetic acid, polyphosphates and citrates; and
(ii) a synthetic crystalline water-insoluble aluminosilicate builder material selected from the group consisting of zeolite A, zeolite X and zeolite P(B), said aluminosilicate material containing at least 10 % by weight of the silicate of water of hydration and having a particle size diameter in the range from 0.5 to 30 micrometers

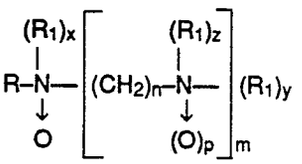
whereby the weight ratio of the water-soluble detergent builder : water-insoluble aluminosilicate builder is in the range from 4 : 1 to 1 : 4.

4. The composition in accordance with claim 1, wherein the amine oxide is selected from the group consisting of N-C_{12-14}-coconutalkyl-N,N-dimethyl N-amine oxide; N-tallow C_{16-18}-alkyl-N,N',N-tri(2-hydroxyethyl) -propylene-1,3 -diamine-N,N'-dioxide; N-C_{12-14}-alkyl-N,N',N'-tri-(2-hydroxyethyl)propylene -1,3-diamine-N,N'-dioxide; N-C_{16-18}-tallow-alkyl-N,N-dimethyl-N-amine oxide; N-C_{12-14}-coconut alkyl-N,N-di-(2 -hydroxyethyl)-N-amine oxide; or N-C_{16-18}-tallow-alkyl-N,N-di-(2-hydroxyethyl)-N-amine oxide.

Patentansprüche

1. Teilchenförmige Reinigungsmittelzusammensetzung mit verbesserten Schmutzfreisetzungs- und Reinigungseigenschaften, enthaltend:

(a) 5 - 25 Gew.-% eines oberflächenaktiven Mittels;
(b) 0,25 - 0,75 Gew.-% eines Aminoxids mit der Formel



worin
R eine Alkyl- oder Alkenylgruppe mit 10 bis 22 Kohlenstoffatomen ist, die Reste R_1, die identisch oder voneinander

verschieden sind, aus C_{1-4}-Alkyl, Ethylenoxid und Propylenoxid ausgewählt sind,
n eine ganze Zahl von 1 bis 6 ist,
m eine ganze Zahl von 0 bis 6 ist,
p 0 oder 1 ist,
x, y und z für Alkylsubstituenten jeweils 1 sind und für Ethylenoxid-oder Propylenoxidsubstituenten solche ganze Zahlen im Bereich von 1 bis 10 sind, daß die Summe von (x+y+z) nicht größer als 25 ist,

(c) 3 - 50 Gew.-% einer Peroxybleichverbindung; und

(d) 10 - 45 Gew.-% eines Detergensgerüststoffes; wobei eine 1 %-ige wäßrige Lösung der Zusammensetzung gemessen bei 20° C, einen pH im Bereich von 8,5 bis 11 hat und wobei das oberflächenaktive Mittel ein anionisches oberflächenaktives Mittel ist.

2. Reinigungsmittelzusammensetzung gemäß Anspruch 1, welche zusätzlich 0,01 Gew.-% bis 10 Gew.-% eines Detergensschaumreglers enthält.

3. Reinigungsmittelzusammensetzung gemäß Anspruch 1, worin der Detergensgerüststoff ein Gemisch aus

(i) einem wasserlöslichen Detergensgerüststoff, ausgewählt aus der aus den wasserlöslichen Salzen von Nitrilotriessigsäure, Polyphosphaten und Citraten bestehenden Gruppe; und

(ii) einem synthetischen, kristallinen, wasserunlöslichen Aluminosilicatgerüststoffmaterial, das aus der aus Zeolith A, Zeolith X und Zeolith P(B) bestehenden Gruppe ausgewählt ist wobei das Aluminosilicatmaterial wenigstens 10 Gew.-% des Silicats an Hydratationswasser enthält und einen Teilchendurchmesser im Bereich von 0,5 bis 30 Mikrometer hat, ist;

wobei das Gewichtsverhältnis des wasserlöslichen Detergensgerüststoffes : wasserunlöslichem Aluminosilicatgerüststoff im Bereich von 4 : 1 bis 1 : 4 liegt.

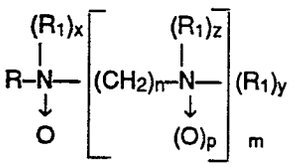
4. Zusammensetzung gemäß Anspruch 1, worin das Aminoxid aus der Gruppe ausgewählt ist, die aus N-C_{12-14}-Kokosnußalkyl-N,N-dimethyl-N-aminoxid; N-Talg -C_{16-18}-alkyl-N,N',N-tri-(2-hydroxyethyl)-propylen-1,3-diamin -N,N'-dioxid; N-C_{12-14}-Alkyl-N,N',N'-tri-(2-hydroxyethyl) -propylen-1,3-diamin-N,N'-dioxid; N-C_{16-18}-Talgalkyl-N,N -dimethyl-N-aminoxid; N-C_{12-14}-Kokosnußalkyl-N,N-di-(2 -hydroxyethyl)-N-aminoxid; und N-C_{16-18}-Talgalkyl-N,N-di-(2-hydroxyethyl)-N-aminoxid besteht.

Revendications

1. Composition détergente particulaire ayant de meilleures propriétés de détachement des salissures et de nettoyage, comprenant:

(a) de 5 % à 25 % en poids d'un agent tensio-actif,

(b) de 0,25 % à 0,75 % en poids d'un oxyde d'amine ayant pour formule:



dans laquelle:
R représente un groupe alkyle ou alcényle ayant 10 à 22 atomes de carbone; les symboles R_1, identiques ou différents, sont choisis parmi les groupes alkyle en C_1-C_4, oxyde d'éthylène et oxyde de propylène;
n est un nombre entier valant 1 à 6;
m est un nombre entier valant 0 à 6;
p vaut 0 ou 1;
x, y et z valent chacun 1 dans le cas des substituants alkyle et sont des nombres entiers compris entre 1 et 10 dans le cas des substituants oxyde d'éthylène ou oxyde de propylène de sorte que la somme (x+y+z) ne soit pas supérieure à 25;

(c) de 3 % à 50 % en poids d'un composé peroxygéné de blanchiment; et

(d) de 10 % à 45 % en poids d'un adjuvant de détergence; de manière qu'une solution aqueuse à 1 % de la composition présente un pH compris entre 8,5 et 11 lorsque la mesure est effectuée à 20°C, l'agent tensio-actif étant un agent tensio-actif anionique.

2. Composition détergente selon la revendication 1, caractérisée en ce qu'elle contient en outre de 0,01 % à 10 % en poids d'un régulateur de mousse pour détergent.

3. Composition détergente selon la revendication 1, caractérisée en ce que l'adjuvant de détergence est un mélange de:

(i) un adjuvant hydrosoluble de détergence, choisi dans l'ensemble constitué par les sels hydrosolubles de l'acide nitrilotriacétique; les polyphosphates et citrates; et
(ii) un adjuvant de détergence, qui est un aluminosilicate cristallin synthétique insoluble dans l'eau, choisi parmi l'ensemble constitué par la zéolite A, la zéolite X et la zéolite P(B), ledit aluminosilicate étant une matière contenant au moins 10 % par rapport au poids du silicate, d'au d'hydratation et ayant un diamètre particulaire se situant entre 0,5 et 30 µm, de sorte que le rapport pondéral de l'adjuvant hydrosoluble de détergence à l'adjuvant de détergence aluminosilicate se situe entre 4 : 1 et 1 : 4.

4. Composition selon la revendication 1, caractérisée en ce que l'oxyde d'amine est choisi parmi l'ensemble constitué par du N-oxyde de N-alyl (en C_{12}-C_{14} de noix de coco) N,N-diméthyl-amine, du N,N'-dioxyde de N-alkyl (en C_{16}-C_{18} de suif) N,N',N-tris-(hydroxy-2-éthyl)-propylène diamine-1,3; du N,N'-dioxyde de N-alkyl (en C_{12}-C_{14}) N,N',N'-tris-(hydroxy-2-éthyl)-propylène diamine-1,3; du N-oxyde de N-alkyl (en C_{16}-C_{18}) de suif) N,N-diméthyl-amine; du N-oxyde de N-alkyl (en C_{12}-C_{14}- de suif) N,N-bis (hydroxy-2-éthyl)-amine ou du N-oxyde de N-alkyl (en C_{16}-C_{18} de suif) N,N-bis-(hydroxy-2-éthyl)-amine.