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Description

This invention relates to aqueous cleaning compositions and especially to chlorine bleach-containing aqueous cleaning compositions useful for the removal of oxidisable stains from and the disinfection of hard surfaces. Compositions in accordance with the invention find particular utility in the cleaning of sanitary fittings such as toilets, bidets, sinks, baths and shower units in addition to the disinfection of drains and the washing of tiled surfaces.

Aqueous chlorine bleaching products are well known in the art and have been used for many years in a variety of bleaching and disinfecting applications. The active component of a product of this type is normally an alkali metal hypochlorite, usually at a level of from 1 to 15% by weight, and the physical characteristics of the product are those of a dilute salt solution with a viscosity less than 20 centistokes (20×10^{-6} M^2s^{-1}).

In recent years, interest has developed in chlorine bleach products of higher viscosity, in order to provide longer lasting adherence to vertical surfaces and hence greater efficacy, and a number of compositions have been disclosed that are stated to be both chemically stable and physically stable over an extended period of time.

Examples of such compositions are disclosed by British Patent No. 1329086, European Published Patent Applications Nos. 0021581, 0030401, French Published Patent Application No. 2355909 and British Patent Application No. 2003522A.

These thickened compositions incorporate one or more bleach stable surfactants as an aid in increasing viscosity and a preferred example of such a surfactant is an amine oxide containing one C_{10}—C_{18} alkyl group and two lower alkyl, usually C_1—C_4 alkyl groups. The compositions also contain a source of alkalinity and alkali metal salts of various kinds.

In order to achieve a significant enhancement of viscosity the prior art has employed other surfactants in admixture with the amine oxide such as alkali metal fatty acid salts, alkali metal alkyl sulphate salts and saccharose esters and viscosities of up to 150 centistokes (150×10^{-6} m^2s^{-1}) at 25°C are stated to be obtainable by this technique.

It has now surprisingly been found that stable aqueous chlorine bleach-containing compositions having viscosities appreciably in excess of 150 centistokes (150×10^{-6} m^2s^{-1}) can be achieved without the necessity of employing the surfactant mixtures taught as necessary by the prior art.

This finding has also simplified the formulation of a thickened chlorine bleach composition insofar as it lowers the level of organic components in the formulation and thereby lessens the problem of ensuring chemical stability as well as reducing the cost of the composition.

It has also been found that compositions in accordance with the invention display cleaning advantages relative to commercially available chlorine bleach compositions embodying the prior art.

According to the present invention there is provided a stable single phase aqueous detergent composition incorporating as the sole surfactant species an amine oxide of formula $R_1R_2R_3N\rightarrow O$ wherein R_1 is an alkyl group in which the average number of carbon atoms is such that $13<R_1\leq16$ and R_2 and R_3 are C_1—C_4 alkyl groups or C_2—C_4 hydroxy alkyl groups together with at least one ionisable water soluble compound wherein the amine oxide is present in an amount of from 1.0% to 2.5% by weight of the composition and in that the at least one ionisable water soluble compound is present in an amount to provide a total ionic strength of the composition of from 3.0 g moles/dm^3 to 7.81 g moles/dm^3, such that said composition has a viscosity of at least 180 cp (0.18 Pa.sec) at 20°C.

In one aspect of the invention the alkyl group R_1 comprises a mixture of groups containing 13 and 15 carbon atoms and comprising a mixture of moieties of structure,

a) $R—\underset{\displaystyle R^4}{\underset{|}{CH}}—CH_2—$

and

b) $R—CH_2—CH_2—$,

the group R_4 being predominantly methyl, the composition also being characterised by a total ionic strength of at least 4.7 g moles/dm^3.

In a preferred aspect of the invention in which the composition incorporates a hypochlorite bleach, R_1 contains an average of from 14 to 16 carbon atoms and is selected from linear moieties and moieties containing no more than 25% methyl branching.

In this specification fluid viscosity is expressed as the dynamic viscosity η in centipoises (10^{-3} Pa.sec). The dynamic viscosity is measured by a Brookfield RVT viscometer and for the purposes of this specification measurements are made with Spindle No. 3 at 100 rpm and a liquid temperature of 20°C. Fluid viscosity can also be expressed as the kinematic viscosity v in centistokes ($10^{-6}m^2\cdot s^{-1}$.) as measured by an Ostwald viscometer and is characterised by the expression $v=\eta/\rho$ where η is the dynamic viscosity in centipoises and ρ is the density in g/cm^3. Compositions in accordance with the present invention have a

density in the range from 1.10 to 1.25 g/cm^3, typically approximately 1.15 g/cm^3, so that the numerical value of the kinematic viscosity in centistokes is slightly less than that of the dynamic viscosity in centipoises.

The invention will be described primarily with reference to an aqueous composition containing an alkali metal hypochlorite bleach, the latter providing the majority, and preferably substantially all, of the ionic strength requirement. However, the invention also embraces non-bleach compositions in which the ionic strength is provided by any ionisable alkali or alkali earth metal compound.

Bleach composition embodiments of the present invention therefore comprise an amine oxide of defined structure and an alkali metal hypochlorite there being sufficient ionisable inorganic salt present to provide an ionic strength of at least 3.0 g moles/dm^3.

The alkali metal hypochlorite may be a lithium, potassium or sodium hypochlorite and the level of hypochlorite in the composition is normally arranged to lie in the range 1—12%, preferably 5—10% by weight. Customarily hypochlorite bleach compositions contain approximately 6% or 9% hypochlorite by weight. However, the activity of chlorine bleaching compositions is conventionally expressed in terms of the weight percentage of available chlorine in the composition, and the actual weight percentage of bleaching species is arranged to provide the desired level of 'available chlorine'. The preferred hypochlorite species is sodium hypochlorite which contains 95.3% available chlorine.

Alkali metal hypochlorites are commercially available as aqueous solutions containing 10—15% by weight 'available chlorine' and the bulk suppliers normally produce material having available chlorine contents towards the upper end of this range viz. 12—14% by weight. These commercially available hypochlorite solutions contain other salts as byproducts or contaminants, more specifically free alkalinity in the form of alkali metal hydroxide and alkali metal carbonate, and alkali metal chloride. Low levels of other species such as sodium chlorate are also believed to be formed during hypochlorite manufacture but their chemical stability is sufficiently low that they have largely decomposed by the time the hypochlorite is employed in product formulations. The levels of the byproduct materials depend on the processing conditions employed in the manufacture of the hypochlorite but in general they fall within the ranges

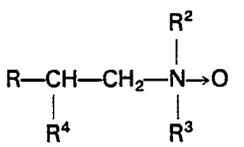
0.2—1.0% alkali metal hydroxide
0.01—0.1% alkali metal carbonate
10.0—18.0% alkali metal chloride

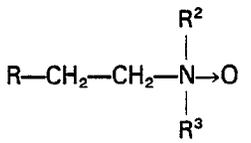
expressed as a weight percentage of the hypochlorite solution as supplied.

Amine oxides useful in the present invention have the formula $R_1R_2R_3N\rightarrow O$ wherein R_1 is an alkyl group in which the number of carbon atoms is $13<R_1\leq 16$ and R_2 and R_3 are C_1—C_4 alkyl groups or C_2—C_4 hydroxy alkyl groups. The amine oxide is present in an amount of from 1.0% to 2.5% and, in preferred embodiments of the invention in which the R_1 average chain length ≥ 14 carbon atoms, from 1% to 1.5% by weight of the composition. The R_1 group may be linear or branched and may be derived from natural or synthetic hydrocarbon sources. For the purposes of the present invention linear groups are defined as including moieties incorporating up to 25% methyl branching, predominantly in the 2-position relative to the nitrogen atom of the amine oxide.

Methyl branching on the alkyl chain also predominates in those amine oxides useful in the present invention in which the R_1 group is branched, rather than linear in nature.

Commercially available sources of these amine oxides are normally a mixture of





which arises as a result of the processing route used to form the precursor alcohol or aldehyde. This route involves carbonylating or hydroformulating an olefin, preferably a linear α-olefin and leads to a mixture of the desired branched chain aldehyde or alcohol of the same carbon number. For olefin starting materials having a range of carbon chain length, the resultant alcohol or aldehyde mixture contains compounds of different carbon number and isomers containing straight chain and 2-alkyl branched chain alkyl groups. A typical mixture useful in the present invention comprises 65 to 75% by weight C_{13} and 35 to 25% by weight C_{15} amine oxides with approximately 50% by weight straight chain and 50% by weight 2-alkyl branched chain where the 2-alkyl group is predominantly methyl. These are available from ICI under the trade name Synprolam 35 DMO as a 30% aqueous solution. The branched chain amine oxides and mixtures thereof with linear chain amine oxides are used at levels towards the upper end of the range viz. ≥2% by weight of the composition and typically from 2.0% to 2.5% by weight.

Although the above-described mixture of straight chain and branched chain alkyl dimethyl amine

oxides has been found to provide the benefits of the invention, their use does not constitute the most preferred execution of the hypochlorite bleach aspect of the invention. This is because an ionic strength of at least 4.7 g moles/dm^3 is required to achieve the target viscosity and this level of ionic strength is believed to make the storage stability of the hypochlorite bleach less than that which is considered desirable for the expected shelf life of the product. For the hypochlorite bleach aspect of the composition, the preferred amine oxide structure is one in which R_1 has an average chain length in the range C_{14}—C_{16} and is a linear group, linear being defined as including moities containing up to 25% 2-methyl branching. Compositions containing these preferred amine oxides require a lower amine oxide level viz. <2.0%, more typically 1.0—1.5% and also a lower ionic strength viz. 3.0 g moles/dm^3 minimum in order to achieve target viscosity. Both of these reductions in ingredient level lead to improved storage stability and also lower the cost of the product.

The ionisable water soluble compound which forms the other major component of the compositions of the invention is a non surface active organic, or inorganic, compound which must be present in an amount to provide an ionic strength of at least 3.0 g moles/dm^3.

The ionisable compound(s) can be inorganic in nature e.g. hydroxide sulphate, halide (particularly chloride) carbonate, nitrate, orthophosphate, pyrophosphate, polyphosphate or silicate, or organic such as citrate, formate, acetate or succinate. In a preferred aspect of the invention in which sodium hypochlorite bleach is incorporated, the hypochlorite itself, together with the sodium hydroxide, chloride and chlorate associated with the bleach provides the, or a major proportion of the ionisable compounds required by the invention. In the preferred hypochlorite bleach-containing embodiments of the invention, certain inorganic compounds such as silicates, and organic compounds incorporating oxidisable groups are unstable and should be avoided.

The ionic strength of the composition is calculated by means of the expression

$$\text{Total Ionic Strength } I = \Sigma \frac{C_i Z_i^2}{2}$$

where

C_i is the molar concentration of the ionic species in g moles/dm^3

Z_i is the valency of the species.

The function $C_i Z_i^2$ is calculated for each of the ionic species in solution, these functions are summed and divided by two to give the composition ionic strength.

The ionisable alkali metal compound normally comprises a caustic alkali such as sodium or potassium hydroxide either alone or in admixture with alkali metal salts. The level of sodium hydroxide necessary to provide a total composition ionic strength of 3.0 g moles/dm^3 where the composition contains only the amine oxide would be approximately 11% to 12% by weight of the composition dependent on the density of the solution. More preferably, for product safety reasons, the at least one ionisable compound comprises a mixture of a caustic alkali in an amount of from 0.5% to 2% by weight of the composition together with one or more alkali metal salts in an amount of at least 10% by weight, more usually at least 15—20%.

In that aspect of the invention directed to liquid detergent compositions suitable for cleaning hard surfaces such as walls and windows, the ionisable compound can include any of the water soluble inorganic and organic builder and sequestrant salts normally incorporated in such products. Compounds classifiable and well-known in the art as detergent builder salts include the nitrilotriacetates, polycarboxylates, citrates, ortho- and pyro-phosphates, and mixtures of any of these. Metal ion sequestrants include all of the above, plus materials like ethylenediaminetetraacetate, the amino-polyphosphonates and phosphates. A wide variety of poly-functional organic acids and salts is disclosed in European Patent Application Publication No. 0040882 which contains examples of the use of such materials in various cleaning compositions. In general the builder/sequestrant will comprise from 1% to 25% of the composition. Citric acid (2%—20% as sodium citrate) is a preferred builder.

In the aspect of the invention in which a hypochlorite bleach is incorporated the bleach itself, containing the range of by-product materials previously mentioned, provides a major portion of the ionic strength requirement, viz at least 3.0 g moles/dm^3 assuming an available chlorine level of 9% in the composition. In practice therefore it is usually only necessary to add alkali metal hydroxide to obtain the desired ionic strength. A highly preferred bleach composition embodiment of the invention therefore comprises from 1% to 1.5% C_{14} linear alkyl dimethyl amine oxide, from 9.0% to 9.5% sodium hypochlorite, from 9.0% to 9.5% sodium chloride and from 0.5% to 1.5% sodium hydroxide. A desirable optional component of compositions in accordance with the invention is a perfume which is present at a level of from 0.01% to 0.5% preferably from 0.05% to 0.25% by weight of the composition.

The compositions are made by conventional mixing techniques. Although any order of mixing can be used, presolution of the alkali metal hydroxide and any alkali metal salt is desirable and these are normally added to a solution of the amine oxide. Perfume is then added under high shear agitation together with any additional water to provide the desired product concentration. In the aspect of the invention in which an alkali metal hypochlorite bleach is included, this component is added last.

The invention is illustrated in the following examples in which percentages are expressed by weight of the composition unless otherwise stated.

In the examples reference to ingredients have been abbreviated as follows:

C_{13}DMO	C_{13} alkyl dimethyl amine oxide in which the alkyl group is 95% C_{13} and approximately 50% of the alkyl groups contain methyl branching on the 2-carbon atom.
C_{15}DMO	C_{15} alkyl dimethyl amine oxide in which the alkyl group is 95% C_{15} and approximately 50% of the alkyl groups contain methyl branching on the 2-carbon atom.
C_{13}—C_{15} DMAO	C_{13}—C_{15} alkyl dimethyl amine oxide in which the alkyl group is 67% C_{13}, 33% C_{15} and the alkyl groups contain approximately 50% methyl branching on the 2-carbon atom. Available from Imperial Chemical Industries Ltd. under the Trade Name Synprolam 35DMO.
C_{14}DMAO	C_{14} alkyl dimethyl amine oxide in which the alkyl group is a predominantly linear C_{14} (>94%) moiety. Available from Albright & Wilson Ltd. as Empigen OH.
NTA	Trisodium nitrilotriacetate.
EDTA	Tetra sodium ethylene diamine tetra acetate.
EDTMP	Octa sodium ethylene diamine tetra methylene phosphonate.
NaPyro	Tetra sodium pyrophosphate.
Na citrate	Trisodium citrate
K Pyro	Tetra potassium pyrophosphate.
Na mellitate	Hexasodium benzene hexacarboxylate.

Example 1

1.0 g of pelleted sodium hydroxide, equivalent to 0.5% of the finished product composition, was dissolved in 7.4 ml soft water and 8.0 g anhydrous sodium carbonate was added to the solution. This solution was then added to 16.6 g of a 30% by weight solution of C_{13-15} alkyl dimethyl amine oxide (available from ICI as Synprolam 35DMO). Finally this mixture was blended with high shear agitation into 167 g of a sodium hypochlorite solution* containing 11.5% by weight of available chlorine.

This composition had the following analysis, in percent by weight and had a density of 1.25 g/cm^2.

NaOCl	10.1 (≡9.6% available chlorine)	1.68 g moles/dm^3
NaCl	13.5	2.88 g moles/dm^3
$NaClO_3$	0.8	0.09 g moles/dm^3
Na_2CO_3	4.1	0.48 g moles/dm^3
NaOH	1.0	0.31 g moles/dm^3
Amine oxide	2.5	
Water & Misc	67.8	
	100.0	

This product was a single phase solution having a dynamic viscosity as measured at 20°C with a

*Supplied by British Drug Houses Ltd. as GPR hypochlorite.

Brookfield viscometer using the No. 3 spindle at 100 rpm was 165 cp (0.165 Pa . sec) fresh and 180 cp (0.18 Pa . sec) after 24 hours.

The ionic strength of this composition was calculated as follows:

$$I = \Sigma\frac{C_i Z_i^2}{2}$$

$$\frac{[1.68]+[2.88]+[0.09]+[2\times0.48]+[0.31]}{2} \text{ (Cations)}$$

$$+\frac{[1.68]+[2.88]+[0.09]+[4\times0.48]+[0.31]}{2} \text{ (Anions)}$$

$$=6.45 \text{ g moles/dm}^3$$

Example 2

20 g powdered anhydrous sodium carbonate and 20 g pelleted sodium hydroxide were dissolved in 200 ml soft water. 66.6 g of a 30% solution of a $C_{13/15}$ alkyl dimethyl amine oxide sold under the trade name Synprolam 35 DMO by ICI Ltd., was added to the alkaline salt solution with high shear agitation. The mixture was then added to 720 g of a sodium hypochlorite solution containing 10% available chlorine sold by British Drug Houses Ltd. and further soft water was added to provide a final composition containing:

7.6%	sodium hypochlorite (≡7.2% available chlorine)
2.5%	sodium hydroxide
2.1%	sodium carbonate
13.5%	sodium chloride
2.0%	$C_{13/15}$ Amine Oxide
72.3%	water and miscellaneous
100.0%	

The ionic strength I of this composition was found to be 5.61 g moles/dm^3 and the dynamic viscosity, measured by means of a Brookfield RVT viscometer (Spindle No. 3 at 100 rpm) at 20°C was 220 cp as (0.22 Pa . sec) as measured 24 hours after the solution was prepared. The density of the solution was 1.25 g/cm^3 so that the calculated kinematic viscosity v was 215.6 centistokes (2.15×10^{-4}m^2/sec).

Example 3

The following composition was prepared using the technique employed in Example 2.

Sodium hypochlorite	8.4%	(≡8.0% available chlorine)
Sodium hydroxide	4.5%	
Sodium chloride	12.7%	
$C_{13/15}$ amine oxide*	2.0%	
Perfume	0.1%	
Water & misc.	72.3%	
	100.0	

*Synprolam DMO

The density of this solution was 1.25 g/cm^3 and on this basis the ionic strength of the composition was calculated to be 5.50 g moles/dm^3. Its viscosity (after 24 hours) was 220 centipoises (0.22 Pa . sec).

Example 4

The following compositions, prepared according to the technique of Example 1 illustrate the criticality of the various features of the invention.

	(a)	(b)	(c)	(d)
Sodium hypochlorite	8.4	8.4	8.4	8.4
Sodium hydroxide	4.5	4.5	0.5	0.5
Sodium chloride	12.7	12.7	12.7	12.7
$C_{12/14}$ linear alkyl dimethyl amine oxide	—	2.0	—	—
$C_{13/15}$ branched alkyl dimethyl amine oxide	2.0	—	2.0	2.5
Water & misc.	72.4	72.4	76.4	76.4
Viscosity 20°C 24 hours preparation				
— cp	220	20	90	105
— Pa . sec	0.22	0.02	0.09	0.105
Composition Ionic strength I g moles/dm^3	5.50	5.50	4.40	4.40

Composition (a) is in accordance with the present invention whilst compositions (b), (c) and (d) are illustrative of prior art products. Comparison of compositions (a) and (b) demonstrates the different viscosity behaviour of products containing a) amine oxides of average chain length $<C_{13}$ and b) amine oxide of average chain length $>C_{13}$ both products being at the same ionic strength. Comparison of compositions (a) and (c) illustrates the role of ionic strength in providing the product viscosities of the present invention. In particular it should be noted that, for amine oxides having a chain length at the lower end of the range found to be useful in the invention, an ionic strength >5.0 g moles/dm^3 is required i.e. appreciably higher than the recited minimum of 3.0 g moles/dm^3. Comparison of compositions (c) and (d) shows that for this amine oxide chain length, increasing amine oxide concentration does not compensate for the shortfall in ionic strength displayed by these compositions.

Example 5

The composition set out in Example 4(a) and designated I was tested for its hard surface cleaning ability relative to a commercially available chlorine bleach product designated II and having the following approximate analysis:

Available chlorine	8.0
$C_{12/14}$ linear alkyl dimethyl amine oxide	1.0
Sodium laurate	0.5
Sodium hydroxide	0.2
Water & misc. to	100

A synthetic soil was made up comprising by volume 8 parts ground garden soil, 4 parts roast lamb fat and 1 part milk. The soil was made up by mixing the fat and garden soil, heating and stirring to melt the fat and then dispersing the milk in the mixture.

15 cm square ceramic tiles were each soiled with 10 ml of the above soil, which was applied by pad and then allowed to dry for one hour or overnight (18 hours).

A soiled tile was then clamped with the soiled surface uppermost at an angle of 30° to the vertical and the soiled surface was divided equally into Left hand and Right hand areas. 14 ml of Product I was applied by syringe on to the Left Hand area and the same volume of Product II was applied to the Right Hand area, each application being arranged to cover the whole surface of the respective area. The areas were then left to drain for 10 minutes or overnight (18 hours) before being rinsed for 10 seconds with water at a rate of 8.5 liters/minute and a temperature of 20°C using a split rinsing head to treat both LH and RH areas simultaneously. Four replicate tests were carried out in two of which the tile areas to which the products were applied were also reversed.

Assessment of cleaning differences between LH and RH areas was carried out by visual grading using a

1—4 scale, higher values denoting enhanced cleaning. Results are given below in which the cleaning performance of Product I is expressed as a difference relative to that of Product II.

Time elapsed after

Soiling	Treatment difference	Cleaning	Yardstick
1 hr	10 mins	+0.78	0.68
18 hrs	10 mins	+1.50	0.32
1 hr	18 hrs	+1.47	0.38
18 hrs	18 hrs	+1.69	0.23

It can be seen that Product I provides significantly better soil cleaning than Product II under the conditions of the Test.

Example 6

The following composition was prepared according to the technique of Example 1:

	(e)	(f)	(g)	(h)	(j)
C_{13}DMAO			1.2		
C_{14}DMAO		1.2		1.5	1.75
C_{15}DMAO	1.2				
NaOH	1.0 →				
NaOCl	9.0 →				
NaCl	9.0 →				
$NaClO_3$	0.6 →				
Water & misc.	to 100 →				
Viscosity (cp)	350	190	30	245	324
(Pa . sec.)	0.35	0.19	0.03	0.245	0.324

The density of each of these compositions was 1.15 g/ml and the ionic strength for each composition was calculated to be 3.5 g moles/dm^3. The product viscosity was measured at 20°C using the technique of Example 1.

It can be seen that an amine oxide alkyl chain length of $>C_{13}$ is required in order to achieve the recited viscosity minimum of 180 cp (0.18 Pa . sec.). An increase in the level of C_{13}DMAO to 5% by weight of the composition did not produce the desired viscosity increase.

Example 7

The following compositions are in accordance with the invention.

	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
C_{13}—C_{15} DMAO	2.5	—	2.5	—	—	2.0	—	—
C_{14} DMAO	—	1.4	—	1.5	1.5	—	1.8	1.4
NaOH	0.5	0.6	0.5	0.5	0.6	0.6	0.5	0.5
NaPyro	5	—	—	—	—	—	—	—
K Pyro	—	—	12	—	—	—	—	—
Na citrate	10	15	—	—	—	—	20	20
Na mellitate	—	—	—	15	—	—	—	—
NTA	—	—	—	—	15	15	—	—
EDTA	—	—	0.2	—	—	—	—	—
EDTMP	0.2	0.2	—	0.2	—	0.2	—	0.2
Perfume	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Water & misc.	To 100							
Ionic strength I (g moles/dm^3) product density basis 1.15 g/cm^3	4.96	3.94	5.03	7.81	4.19	4.30	5.40	5.52

All of the compositions exhibit viscosities in excess of 200 cp (0.20 Pa . sec.) at 20°C after 24 hours.

Claims

1. A stable single phase aqueous detergent composition incorporating as the sole surfactant species an amine oxide of formula $R_1R_2R_3N\rightarrow O$ wherein R_1 is an alkyl group in which the average number of carbon atoms is such that $13<R_1\leq 16$ and R_2 and R_3 are C_1—C_4 alkyl groups or C_2—C_4 hydroxy alkyl groups together with at least one ionisable water soluble compound characterised in that the amine oxide is present in an amount of from 1.0% to 2.5% by weight of the composition and in that the at least one ionisable water soluble compound is present in an amount to provide a total ionic strength of the composition of from 3.0 g moles/dm^3 to 7.81 g moles/dm^3, such that said composition has a viscosity of at least (0.18 Pa . sec.) 180 cp at 20°C.

2. An aqueous detergent composition according to claim 1 characterised in that the alkyl group R_1 comprises a mixture of groups containing 13 and 15 carbon atoms and comprising a mixture of moieties of structure,

a) $R—CH(R^4)—CH_2—$

and

b) $R—CH_2—CH_2—$,

the group R_4 being predominantly methyl, the composition also being characterised by a total ionic strength of at least 4.7 g moles/dm^3.

3. An aqueous detergent composition according to Claim 2 wherein a) and b) are present in approximately equal proportions by weight.

4. An aqueous detergent composition according to Claim 1 wherein R_1 contains an average of from 14 to 16 carbon atoms and is selected from linear moieties and moieties containing no more than 25% 2-methyl branching.

5. An aqueous detergent composition according to any one of Claims 1—4 characterised in that the ionisable water soluble compound is an organic or inorganic builder or sequestrant salts.

6. An aqueous detergent composition according to Claim 5 wherein the water soluble compound is selected from alkali metal carbonates, citrates, pyrophosphates, amino polyacetates and amino polyphosphonates.

7. An aqueous detergent composition according to any one of Claims 1—4 characterised in that substantially all of the ionic strength is provided by a mixture of alkali metal hypochlorite, alkali metal chloride and alkali metal hydroxide.

8. An aqueous detergent composition according to Claim 7 as dependent on Claim 4 characterised in that it comprises from 1% to 1.5% C_{14} linear alkyl dimethyl amine oxide, from 9.0% to 9.5% sodium hypochlorite, from 9.0% to 9.5% sodium chloride and from 0.5% to 1.5% sodium hydroxide.

9. An aqueous detergent composition according to either one of Claims 7 and 8 wherein the composition incorporates a bleach stable perfume.

Patentansprüche

1. Eine stabile einphasige wässerige Reinigungsmittelzusammensetzung, die als einzige Sorte von oberflächenaktivem Mittel ein Aminoxid der Formel $R_1R_2R_3N\rightarrow O$, worin R_1 eine Alkylgruppe ist, in welcher die mittlere Zahl von Kohlenstoffatomen derart ist, daß $13<R_1\leq 16$, und R_2 und R_3 C_1—C_4-Alkylgruppen oder C_2—C_4-Hydroxyalkylgruppen sind, zusammen mit wenigstens einer ionisierbaren, wasserlöslichen Verbindung einverleibt enthält, dadurch gekennzeichnet, daß das Aminoxid in einer Menge von 1,0 Gew.-% bis 2,5 Gew.-% der Zusammensetzung vorliegt, und daß sie wenigstens eine ionisierbare, wasserlösliche Verbindung in einer Menge vorliegt, um eine Gesamtionenstärke der Zusammensetzung von 3,0 g-Mol/dm³ bis 7,81 g-Mol/dm³ einzustellen, sodaß die genannte Zusammensetzung eine Viskosität von wenigstens 0,18 Pa . sec (180 cP) bei 20°C hat.

2. Eine wässerige Reinigungsmittelzusamennsetzung nach Anspruch 1, dadurch gekennzeichnet, daß die Alkylgruppe R_1 ein Gemisch von 13 und 15 Kohlenstoffatome enthaltenden Gruppen umfaßt, die ein Gemisch von Resten der Struktur

a) $R—CH(R^4)—CH_2—$

und

b) $R—CH_2—CH_2—$

enthalten, wobei die Gruppe R_4 überwiegend Methyl ist und die Zusammensetzung auch durch eine Gesamtionenstärke von wenigstens 4,7 g-Mol/dm³ gekennzeichnet ist.

3. Eine wässerige Reinigungsmittelzusammensetzung nach Anspruch 2, in der a) und b) in annähernd gleichen Gewichtsanteilen vorliegen.

4. Eine wässerige Reinigungsmittelzusammensetzung nach Anspruch 1, worin R_1 im Mittel 14 bis 16 Kohlenstoffatome enthält und aus geraden Resten und Resten, die nich mehr als 25% 2-Methyl-Verzweigung aufweisen, ausgewählt ist.

5. Eine wässerige Reinigungsmittelzusamennsetzung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die ionisierbare, wasserlösliche Verbindung ein organisches oder anorganisches Gerüststoff- oder komplexbildendes Salz ist.

6. Eine wässerige Reinigungsmittelzusammensetzung nach Anspruch 5, worin die wasserlösliche Verbindung aus Alkalimetallcarbonaten, -citraten, pyrophosphaten, -aminopolyacetaten und -aminopolyphosphaten ausgewählt ist.

7. Eine wässerige Reinigungsmittelzusammensetzung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß im wesentlichen die gesamte Ionenstärke durch ein Gemisch aus Alkalimetyllhypochlorit, Alkalimetallchlorid und Alkalimetallhydroxid geliefert wird.

8. Eine wässerige Reinigungsmittelzusammensetzung nach Anspruch 7, in Abhängigkeit von Anspruch 4, dadurch gekennzeichnet, daß sie 1% bis 1,5% C_{14}-linear-Alkyldimethylaminoxid, 9,0% bis 9,5% Natriumhypochlorit, 9,0% bis 9,5% Natriumchlorid und 0,5% bis 1,5% Natriumhydroxid enthält.

9. Eine wässerige Reinigungsmittelzusammensetzung nach einem der Ansprüche 7 oder 8, wobei die Zusammensetzung ein Bleichmittel-stabiles Parfum einverleibt enthält.

Revendications

1. Une composition détergente aqueuse, stable à une phase, contenant comme espèce tensioactive unique un oxyde d'amine de formule $R_1R_2R_3N\rightarrow O$ où R_1 est un groupe alkyle dans lequel le nombre moyen d'atomes de carbone est tel que $13<R_1\leq 16$ et R_2 et R_3 sont des groupes alkyles en C_1 à C_4 ou des groupes hydroxyalkyles en C_2 à C_4, conjointement avec au moins un composé hydrosoluble ionisable, caractérisée en ce que l'oxyde d'amine est présent en une quantité de 1,0% à 2,5% en poids de la composition et qu'au moins le composé hydrosoluble ionisable est présent en une quantité susceptible d'assurer une force ionique totale de la composition de 3,0 moles-g/dm³ à 7,81 moles-g/dm³, de manière que ladite composition ait une viscosité d'au moins 0,18 Pa . s (180 cp) à 20°C.

2. Composition détergente aqueuse selon la revendication 1, caractérisée en ce que le groupe alkyle R_1 comprend un mélange de groupes contenant 13 à 15 atomes de carbone et comportant un mélange de radicaux de structure,

a) $R—\underset{\displaystyle R^4}{\underset{|}{CH}}—CH_2—$

et

b) $R—CH_2—CH_2—$,

le groupe R_4 étant en prédominance un méthyle, la composition étant également caractérisée par une force ionique totale d'au moins 4,7 moles-g/dm^3.

3. Composition détergente aqueuse selon la revendication 2, dans laquelle a) et b) sont présents en des proportions pondérales approximativement égales.

4. Composition détergente aqueuse selon la revendication 1, dans laquelle R_1 contient une moyenne de 14 à 16 atomes de carbone et est choisi parmi des radicaux linéaires et des radicaux ne comportant pas plus de 25% de ramification méthyle-2.

5. Composition détergent aqueuse selon l'une quelconque des revendications 1 à 4, caractérisée en ce que le composé hydrosoluble ionisable est un adjuvant de détergence organique ou minéral ou un sel séquestrant.

6. Composition détergente aqueuse selon la revendication 5, dans laquelle le composé hydrosoluble est choisi parmi des carbonates, des citrates, des pyrophosphates, des aminopolyacétates et des aminopolyphosphates de métaux alcalins.

7. Composition détergente aqueuse selon l'une quelconque des revendications 1 à 4, caractérisée en ce que la quasi totalité de la force ionique est apportée par un mélange d'hypochlorite de métal alcalin, de chlorure de métal alcalin et d'hydroxyde de métal alcalin.

8. Composition détergente aqueuse selon la revendication 7 comme dépendant de la revendication 4, caractérisée en ce qu'elle contient 1% à 1,5% d'oxyde d'alkyl (en C_{14} linéaire) diméthylamine, 9,0% à 9,5% d'hypochlorite de sodium, 9,0% à 9,5% de chlorure de sodiume et 0,5% à 1,5% d'hydroxyde de sodium.

9. Composition détergente aqueuse selon l'une des revendications 7 et 8, dans laquelle la composition comprend un parfum stable vis à vis de l'agent de blanchiment.