

Description

The present invention relates to stable liquid diperoxyacid bleach compositions useful for bleaching fabrics, hard surfaces and other substrates. The compositions contain water-insoluble aliphatic diperoxyacid particles, C_{11} - C_{13} linear alkylbenzene sulfonate surfactant, cumene sulfonate as an optional ingredient, magnesium sulfate, sodium or potassium sulfate as an optional ingredient, and water. The compositions also have a pH of from 2 to 4.5 and a viscosity of from 50 to 1000 mPa·s at 20°C. The ingredients are combined at certain carefully balanced levels and ratios, as hereinafter described, to provide compositions exhibiting good physical and chemical stability.

Background Art

European Patent Application 160 342, Humphreys et al, published November 6, 1985, discloses aqueous liquid bleaching compositions containing organic peroxyacid particles suspended in an acidic surfactant-structured liquid. The disclosed compositions do not contain magnesium sulfate.

U.S. Patent 3 996 152, Edwards et al, issued December 7, 1976, discloses stable, low-pH gels containing peroxyacid bleach particles and a non-starch thickening agent.

U.S. Patent 4 100 095, Hutchins, issued July 11, 1978, discloses the stabilization of peroxyacid bleaches by the use of certain exotherm control agents.

Despite the above attempts to stabilize liquid diperoxyacid bleaching compositions, there is a continuing need for the development of physically and chemically stable liquid diperoxyacid bleaches having a high level of diperoxyacid and a low viscosity.

Summary of the Invention

The present invention relates to a stable liquid bleach composition comprising, by weight:

(a) from 10% to 25% of water-insoluble diperoxyacid particles of the formula $\text{HOOC}(\text{CH}_2)_n\text{COOOH}$, wherein n is from 7 to 14, said particles having an average size of from 0.5 to 15 micrometers;

(b) from 2% to 6%, on an acid basis, of a water-soluble C_{11} - C_{13} linear alkylbenzene sulfonate surfactant;

(c) from 0% to 8%, on an acid basis, of a water-soluble cumene sulfonate;

(d) from 0% to 7% sodium or potassium sulfate; and

(e) from 40% to 78% water; characterized in that it further contains from 5% to 15% of magnesium sulfate, provided that the total of (b) and (c) is from 3% to 14% the total of magnesium sulfate, sodium sulfate and potassium sulfate is from 5% to 16%, and the total of (b), (c) magnesium sulfate, sodium sulfate and potassium sulfate is from 12% to 30%; the weight ratio of (a) to magnesium sulfate being less than 3:1; and said composition having a pH of from 2 to 4.5 and a viscosity of from 50 to 1000 mPa·s at 20°C, the viscosity being measured with an LTV Brookfield Viscometer, using a No. 3 spindle and a setting of 60 rpm.

Detailed Description of the Invention

The liquid bleach compositions herein contain water-insoluble aliphatic diperoxyacid particles, C_{11} - C_{13} linear alkylbenzene sulfonate surfactant, cumene sulfonate as an optional ingredient, magnesium sulfate, sodium or potassium sulfate as an optional ingredient and water. These essential ingredients are combined at certain carefully balanced levels and ratios to obtain compositions having a high level of peroxyacid bleach, low product viscosity, and good physical and chemical stability. The compositions generally remain as stable suspensions having little or no separation of ingredients during storage, preferably for as long as 2 months at room temperature. The compositions also have chemical (i.e., peroxyacid) stability of at least about 80%, with the preferred compositions having at least about 90% stability after 2 months storage at room temperature.

The compositions of the present invention have a pH of from 2 to 4.5, preferably from 2.5 to 4, most preferably from 3 to 3.5, when measured at 20°C for best peroxyacid bleach stability.

The compositions also have a viscosity of from 50 to 1000 mPa·s to, preferably from 60 to 750 mPa·s, more preferably from 75 to 500 mPa·s, and most preferably from 100 to 350 mPa·s, at 20°C, when measured with an LTV Brookfield Viscometer, using a No. 3 spindle and a setting of 60 rpm. This relatively low viscosity is desired for convenient pouring from a container by the user.

The compositions of the present invention contain from 10% to 25%, preferably from 12% to 22%, more preferably from 14% to 20%, most preferably from 15% to 20%, by weight, of water-insoluble diperoxyacid particles of the formula $\text{HOOC}(\text{CH}_2)_n\text{COOOH}$, wherein n is from 7 to 14, preferably from 8 to 12. The particles have an average size of from 0.5 to 15, preferably from 0.5 to 10, micrometers. A particularly preferred material is 1,12-diperoxydodecanedioic acid (DPDA).

The compositions contain from 2% to 6%, preferably from 2% to 4%, by weight on an acid basis, of a water-soluble (e.g., alkali metal, ammonium or alkylammonium) C_{11} - C_{13} linear alkylbenzene sulfonate

surfactant. The alkylbenzene sulfonate contributes to physical stability by dispersing the peroxyacid particles. However, since it also increases product viscosity, particularly when used at higher levels within the claimed range and when shorter carbon chain (e.g., C_{11} or C_{12}) alkylbenzene sulfonates are selected, the type and level of alkylbenzene sulfonate must be selected along with the other ingredients herein to provide the desired viscosity. The C_{13} alkylbenzene sulfonates are particularly preferred.

The compositions can also contain from 0% to 8%, preferably from 1% to 6%, most preferably from 2% to 5%, by weight on an acid basis, of a water-soluble (e.g., alkali metal, ammonium or alkylammonium) cumene sulfonate. Cumene sulfonate also functions as a dispersant for the peroxyacid particles, and it significantly decreases viscosity. It thus can serve as a thinning agent and as a partial replacement for the C_{11} - C_{13} linear alkylbenzene sulfonate surfactant. In certain compositions, the cumene sulfonate represents from 0% to 4%, preferably from 1% to 3%, by weight on an acid basis, of the composition.

The bleach compositions herein further contain from 5% to 15%, preferably from 8% to 12%, by weight, of magnesium sulfate. The magnesium sulfate helps to suspend the diperoxyacid particles via density matching in range of from 1.15 to 1.22 g/ml. Magnesium sulfate also functions as an effective exotherm control agent in the present compositions.

The compositions further contain from 0% to 7%, preferably from 2% to 6%, by weight, of sodium sulfate or potassium sulfate. Sodium and potassium sulfate, and to a lesser extent the cumene sulfonate, can be used to help match the density of, and thereby suspend, the peroxyacid particles. Mixtures of sodium or potassium sulfate, cumene sulfonate and magnesium sulfate are preferred to avoid adding excessive magnesium hardness to the wash water. The mixture of these salts also appears to be more effective at physically stabilizing the peroxyacid particles since less of the mixture is required to stabilize the composition than when magnesium sulfate alone is used. However, sodium and potassium sulfate significantly increase viscosity, and so their use must be limited to meet the desired viscosity range.

Finally, the compositions contain from 40% to 78%, preferably from 50% to 70%, by weight, of water.

In addition to the above, the C_{11} - C_{13} alkylbenzene sulfonate and cumene sulfonate together should represent from 3% to 14%, preferably from 4% to 12%, most preferably from 4% to 10%, by weight, of the composition to provide sufficient dispersant for the peroxyacid particles while maintaining the desired low viscosity. In certain compositions, the C_{11} - C_{13} alkylbenzene sulfonate and cumene sulfonate together represent from 3% to 10%, preferably from 3% to 8%, most preferably from 3.5% to 6%, by weight of the composition.

The magnesium sulfate and sodium or potassium sulfate should represent from 5% to 16%, preferably from 8% to 16%, more preferably from 10% to 15%, by weight of the composition in order to adequately suspend the peroxyacid particles. The weight ratio of magnesium sulfate to sodium or potassium sulfate is preferably from 1:1 to 4:1, more preferably from 2:1 to 3:1, for the desired combination of exotherm stability, low wash water hardness, and low viscosity.

The C_{11} - C_{13} alkylbenzene sulfonate, cumene sulfonate, magnesium sulfate and sodium or potassium sulfate together should represent from 12% to 30%, preferably from 12% to 25%, more preferably from 14% to 25%, most preferably from 14% to 20%, by weight of the composition to provide sufficient dispersing and suspending agents.

The weight ratio of diperoxyacid particles to magnesium sulfate should also be less than 3:1, preferably less than 2.5:1, for best exotherm stability.

The bleaching compositions of the present invention can, of course, be employed by themselves as bleaching agents. However, such compositions will more commonly be used as one element of a total bleaching or laundering composition.

Bleaching compositions herein can contain any of the optional ingredients known for use in such compositions.

The compositions herein can contain minor amounts, generally less than 5%, preferably less than 2%, most preferably less than 1%, by weight, of other synthetic surfactants, such as other anionic, nonionic, cationic and zwitterionic surfactants, or mixtures thereof, known in the art. However, such additional surfactants, particularly nonionic and cationic surfactants, have been found to increase viscosity and to cause phase separation when used at higher levels, and thus are not preferred for use herein. Preferably, the compositions are substantially free of such other surfactants. The compositions herein generally contain less than 2%, preferably less than 1%, by weight, of other anionic synthetic surfactants. Preferably, the compositions are essentially free of such other anionic synthetic surfactants.

Since the peroxyacid compounds used in the compositions of the present invention are subject to the loss of available oxygen when contacted by heavy metals, it is desirable to include a chelating agent in the compositions. Such agents are preferably present in an amount ranging from 0.005% to 1.0% by weight of the composition. The chelating agent can be any of the well-known agents, including those described in U.S. Patent 3 442 937, issued May 6, 1969 to Sennewald et al., U.S. Patent 2 838 459, issued July 10, 1958 to Sprout, Jr., and U.S. Patent 3 192 255, issued June 29, 1965 to Cann. Preferred chelating agents are picolinic acid and dipicolinic acid.

Bleaching compositions of the present invention are utilized by adding them to water in an amount sufficient to provide from 1.0 ppm to 100 ppm, preferably from 1.0 ppm to 50 ppm, available oxygen in solution. Generally, this amounts to 0.01% to 0.4%, preferably from 0.01% to 0.2%, by weight of composition in solution. Fabrics to be bleached are then contacted with such aqueous bleaching solutions.

The compositions of the present invention can also be used in combination with conventional fabric laundering detergent compositions. Such compositions can contain standard detergent ingredients, such as the surfactants and builders described in U.S. Patent 4 100 095, Hutchins et al., issued July 11, 1978. Preferred detergent compositions are described in U.S. Patent 4 561 998, Wertz, et al., issued December 31, 1985, and U.S. Patent 4 507 219, Hughes, issued March 26, 1985.

Preferably, detergent compositions formulated for use with bleaching compositions herein have a pH of from 9 to 12, preferably from 9.5 to 11.5, more preferably from 10 to 11. They preferably contain from 2% to 15%, more preferably from 4% to 10%, by weight, of monoethanolamine. The combination of such an alkaline composition with a bleaching composition herein preferably delivers a wash water pH of from 7.8 to 9, preferably from 7.9 to 8.5, which is desired for good bleaching performance, a minimum of fabric yellowing, and a minimum of bleach decomposition by the monoethanolamine.

The following examples illustrate the compositions of the present invention.

All parts, percentages and ratios used herein are by weight unless otherwise specified.

Example I

The following composition was prepared by high shear mixing of the components in an Eppenbach mixer while in an ice bath. The DPDA and water were added to the mixer before turning the mixer on. The suds suppressor was added to minimize foaming while mixing and to minimize air entrapment in the finish composition. The other components were added in the order listed at the indicated times after turning on the mixer.

Component	Grams	Wt. %	Time
1,12-Diperoxydodecanedioic acid (DPDA) (26.68% active slurry*)	10,821.6	18.0	0
Water (additional)	1896	11.8	0
Suds suppressor	12.8	0.08	1 min.
C ₁₃ linear alkylbenzene sulfonic acid (98% active*)	417.8	2.5	3 min.
Sodium cumene sulfonate (50% active*)	463.4	1.45	3 min.
Dipicolinic acid	1.6	0.01	3 min.
Sodium sulfate	841.6	4.0	1 hr. 25 min.
Magnesium sulfate	1684.2	10.5	2 hr. 10 min.
Sodium hydroxide (50% active*)	104	0.32	3 hr. 10 min.
* Balance primarily water			

After 3 hr. 30 min., the pH of the composition was determined to be 3.20 at 20°C. After 4 hr. 10 min., the pH was again determined to be 3.20 at 20°C and the mixer was turned off. The composition was a stable suspension of the ingredients. It has a viscosity of about 350 mPa·s at 20°C. The DPDA had an average particle size of 2–5 micrometers.

The above describes the preferred process for making the composition since high shear mixing of the components in an ice bath, their order of addition and the approximate times of addition have all been found to be important to obtain the desired physical stability.

After 9 days, there still was no physical separation of the composition. A 951 gram sample of the composition was removed from the bottom and analyzed. It contained 18.29% DPDA and 10.81% magnesium sulfate. Since the target composition was 18.0% DPDA, chemical stability was very good.

After 11 days, about 48 grams of water were removed from the bottom of the composition. Since this represents only about 0.3% of the composition, physical stability was very good.

After 18 days, the original composition was transferred, along with 5 other samples of similar composition and preparation, to a 55 gallon (about 200 liters) drum and mixed by hand. The mixture was analyzed to contain 18.29% DPDA. It had a viscosity of about 350 mPa·s, a density of 1.187 g/ml, and a pH of 3.20, all measured at 20°C. The next day, samples of the mixture were placed in storage at 40°F (4.44°C), 50°F (10°C), 70°F (21.1°C), 90°F (32.2°C) and 100°F (37.8°C).

After 17 days, the samples had very good physical and chemical stability, as indicated below.

Physical Stability

4.44°C – OK. Very slight clear aqueous layer on top.

10°C – OK. No separation.

21.1°C – OK. No separation.

32.2°C. – OK. Less than about 2% clear aqueous layer on bottom.

37.8°C – Less than about 5% clear aqueous layer on bottom.

5 Chemical Stability

10°C – 18.25% DPDA

21.1°C – 18.21% DPDA

32.2°C – 18.28% DPDA

- 10 The above composition is preferably used in combination with the following detergent composition. The detergent composition was prepared by adding the following components to a mixing tank in the order listed with continuous mixing.

15	Components	% Assay	Wt. % Product	Wt. % Stock
	Sodium C ₁₄₋₁₅ alkyl polyethoxylate (2.25) sulfate	48.8	11.3	23.2 ¹
	C ₁₃ linear alkylbenzene sulfonic acid	96.0	8.0	8.33
	Sodium diethylenetriamine pentaacetate	41.0	0.35	0.7
20	Propylene glycol	100.0	10.5	10.5
	Monoethanolamine	100.0	5.0	3.0
	Brightener mix	100.0	–	6.21 ²
	C ₁₂₋₁₃ alcohol polyethoxylate (6.5)*	100.0	9.0	7.0
25	Ethanol	92.0	10.48	7.3
	Potassium hydroxide	45.0	2.48	5.51
	Sodium hydroxide	50.0	2.94	5.88
30	Boric Acid	100.0	1.25	1.25
	Water	–	–	5.65
	Sodium 2-dodecanyl succinate	80.0	5.53	6.9
	C ₁₂₋₁₄ fatty acid	100.0	3.5	3.5
35	Citric acid	50.0	4.0	8.0
	Calcium formate	10.0	0.12	1.2
	TEPA-E ₁₅₋₁₈ **	80.0	3.0	3.75
	pH trim to 10.5	–	–	–
40	Protease enzyme (2.0 AU/g)	100.0	1.16	1.16
	Amylase enzyme (375 AM. U/g)	100.0	0.16	0.16
	Perfume	100.0	0.25	0.25
45	Dye	100.0	0.08	0.08
	Water	–	to 100%	3.25

¹Paste also contains 16.2% ethanol and 35% water.

²Contains 32.2% monoethanolamine, 32.2% water, 32.2% C₁₂₋₁₃ alcohol polyethoxylate (6.5)*, and 3.36% of brightener.

*Alcohol and monoethoxylated alcohol removed.

**Tetraethylene pentamine ethoxylated with 15–18 moles (avg.) of ethylene oxide at each hydrogen site.

- 55 The compositions are preferably used in a volume ratio of detergent composition to liquid bleach of 5.5:1. The detergent composition is designed for a usage level of about 0.55 cups (about 140 ml) in a typical U.S. laundering process. This delivers a concentration of product in the wash water of about 0.22% by weight. Usage of about 0.1 cups (i.e., about 25 ml) of the liquid bleach would deliver about 10 ppm of available oxygen to the wash water. The detergent composition and liquid bleach are preferably simultaneously codispensed from a dual compartment bottle at a volume ratio of detergent to bleach of 5.5:1.

60 The mixture of the succinate and fatty acid builders in the above detergent composition is preferred because it causes less fabric yellowing and measuring cup residue than an all fatty acid formula when used with the above liquid bleach.

65

Example II

Other compositions of the present invention, which can be prepared as in Example I, are as follows:

Components	Wt. %			
	A	B	C	D
1,12-Diperoxydodecanedioic acid*	12.5	—	25.0	21.0
1,9-Diperoxyazelaic acid*	—	15.0	—	—
Water	73.0	63.0	56.0	65.0
C ₁₃ linear alkylbenzene sulfonic acid	4.0	3.0	4.0	—
C _{11,4} linear alkylbenzene sulfonic acid	—	—	—	3.0
Sodium cumene sulfonate	—	2.0	—	—
Magnesium sulfate	6.6	13.0	10.5	9.2
Sodium sulfate	3.1	—	2.5	—
Potassium sulfate	—	—	—	1.0
Suds suppressor	—	0.1	0.02	0.02
Dipicolinic acid	0.01	0.02	0.01	0.01
Sodium hydroxide to pH:	3.8	3.2	3.35	3.25
Viscosity (mPa · s at 20°C)	450	**	900	**

*Average particle size 2–5 micrometers, after preparation.
**Within the range of 50–1000.

Example III

After storage of an about 22.3 kg sample of the liquid bleach mixture of Example I for 8 months at 20°C, a clear aqueous layer (about 6 kg) was removed from the bottom of the sample and the remainder was analyzed to contain the following:

Components	Wt. %
1,12-Diperoxydodecanedioic acid (DPDA)	16.9
Water	57.0
Suds suppressor	0.11
C ₁₃ linear alkylbenzene sulfonic acid	3.4
Sodium cumene sulfonate	1.8
Dipicolinic acid	0.01
Sodium sulfate	3.5
Magnesium sulfate	9.2
Miscellaneous	balance

The composition had a viscosity of about 850 mPa·s measured at 20°C. An additional 6.4 parts of sodium cumene sulfonate (50% active) was added to 100 parts of the composition to reduce its viscosity to about 240 mPa·s at 20°C. This composition had a pH of 2.6. Its pH was adjusted to 3.15 by adding a 50% solution of sodium hydroxide, resulting in a finished liquid bleach composition containing 15.5% DPDA.

The above liquid bleach composition is preferably used in combination with the following liquid detergent composition, which was prepared by adding the components to a mixing tank in the order listed with continuous mixing.

	Components	% Assay	Wt. % Product	Wt. % Stock
	C ₁₃ linear alkylbenzene sulfonic acid	45.0	7.87	17.49 ¹
5	Sodium C ₁₄₋₁₅ alkyl polyethoxylate (2.25) sulfate	48.4	11.86	24.51 ²
	Propylene glycol	100.0	8.38	3.53
	Sodium diethylenetriamine pentaacetate	41.0	0.30	0.73
	Brightener mix	100.0	—	6.70 ³
10	Monoethanolamine	100.0	4.5	2.50
	C ₁₂₋₁₃ alcohol polyethoxylate (6.5)*	100.0	4.93	2.93
	Ethanol	92.0	3.94	—
	Sodium hydroxide	50.0	4.19	5.38
15	Potassium hydroxide	45.0	1.18	2.62
	C ₁₂₋₁₄ fatty acid	100.0	9.86	9.86
	Citric acid	50.0	3.94	7.88
20	Calcium formate	10.0	0.12	1.20
	Sodium formate	30.0	0.86	2.77
	C ₁₂ alkyltrimethylammonium chloride	37.0	0.6	1.62
	TEPA-E ₁₅₋₁₈ **	80.0	1.97	2.46
25	pH trim to 10.5			
	Protease enzyme (2.0 AU/g)	100.0	0.74	0.74
	Amylase enzyme (375 AM. U/g)	100.0	0.16	0.16
	Dye	100.0	0.08	0.08
30	Perfume	100.0	0.25	0.25
	Water	—	to 100%	6.59

¹Paste also contains 1.4% sodium hydroxide, 8.44% monoethanolamine, 25% propylene glycol, and 20.16% water.

²Paste also contains 16.2% ethanol, 5.12% sodium hydroxide, and 30.3% water.

³Contains 7.46% monoethanolamine, 29.82% C₁₂₋₁₃ alcohol polyethoxylate (6.5)*, 59.65% water, and 3.07% brightener.

* Alcohol and monoethoxylated alcohol removed.

**Tetraethylene pentamine ethoxylated with 15-18 moles (avg.) of ethylene oxide at each hydrogen site.

The compositions are preferably used in a volume ratio of detergent composition to liquid bleach of 4:1. The detergent composition is designed for a usage level of about 0.5 cups (about 125 ml) in a typical U.S. laundering process. This delivers a concentration of product in the wash water of about 0.2% by weight. Usage of about 0.125 cups (i.e., about 30 ml) of the liquid bleach would deliver about 10 ppm of available oxygen to the wash water. The detergent composition and liquid bleach are preferably simultaneously codispensed from a single dosing, dual compartment cup at a volume ratio of detergent to bleach of 4:1.

Claims

1. A stable liquid bleach composition comprising, by weight:

(a) from 10% to 25% of water-insoluble diperoxyacid particles of the formula $\text{HOOC}(\text{CH}_2)_n\text{COOOH}$, wherein n is from 7 to 14, said particles having an average size of from 0.5 to 15 micrometers;

(b) from 2% to 6%, on an acid basis, of a water-soluble C₁₁-C₁₃ linear alkylbenzene sulfonate surfactant;

(c) from 0% to 8%, on an acid basis, of a water-soluble cumene sulfonate;

(d) from 0% to 7% sodium or potassium sulfate; and

(e) from 40% to 78% water;

characterized in that it further contains from 5% to 15% of magnesium sulfate, provided that the total of (b) and (c) is from 3% to 14%; the total of magnesium sulfate, sodium sulfate and potassium sulfate is from 5% to 16%; and the total of (b), (c), magnesium sulfate, sodium sulfate and potassium sulfate is from 12% to 30%; the weight ratio of (a) to magnesium sulfate being less than 3:1; and said composition having a pH of from 2 to 4.5 and a viscosity of from 50 to 1000 mPa·s at 20°C, the viscosity being measured with an LTV Brookfield Viscometer, using a No. 3 spindle and a setting of 60 rpm.

	Components	% Assay	Wt. % Product	Wt. % Stock
	C ₁₃ linear alkylbenzene sulfonic acid	45.0	7.87	17.49 ¹
5	Sodium C ₁₄₋₁₅ alkyl polyethoxylate (2.25) sulfate	48.4	11.86	24.51 ²
	Propylene glycol	100.0	8.38	3.53
	Sodium diethylenetriamine pentaacetate	41.0	0.30	0.73
	Brightener mix	100.0	—	6.70 ³
10	Monoethanolamine	100.0	4.5	2.50
	C ₁₂₋₁₃ alcohol polyethoxylate (6.5)*	100.0	4.93	2.93
	Ethanol	92.0	3.94	—
	Sodium hydroxide	50.0	4.19	5.38
15	Potassium hydroxide	45.0	1.18	2.62
	C ₁₂₋₁₄ fatty acid	100.0	9.86	9.86
	Citric acid	50.0	3.94	7.88
20	Calcium formate	10.0	0.12	1.20
	Sodium formate	30.0	0.86	2.77
	C ₁₂ alkyltrimethylammonium chloride	37.0	0.6	1.62
	TEPA-E ₁₅₋₁₈ **	80.0	1.97	2.46
25	pH trim to 10.5			
	Protease enzyme (2.0 AU/g)	100.0	0.74	0.74
	Amylase enzyme (375 AM. U/g)	100.0	0.16	0.16
	Dye	100.0	0.08	0.08
30	Perfume	100.0	0.25	0.25
	Water	—	to 100%	6.59

¹Paste also contains 1.4% sodium hydroxide, 8.44% monoethanolamine, 25% propylene glycol, and 20.16% water.

²Paste also contains 16.2% ethanol, 5.12% sodium hydroxide, and 30.3% water.

³Contains 7.46% monoethanolamine, 29.82% C₁₂₋₁₃ alcohol polyethoxylate (6.5)*, 59.65% water, and 3.07% brightener.

* Alcohol and monoethoxylated alcohol removed.

**Tetraethylene pentamine ethoxylated with 15-18 moles (avg.) of ethylene oxide at each hydrogen site.

The compositions are preferably used in a volume ratio of detergent composition to liquid bleach of 4:1. The detergent composition is designed for a usage level of about 0.5 cups (about 125 ml) in a typical U.S. laundering process. This delivers a concentration of product in the wash water of about 0.2% by weight. Usage of about 0.125 cups (i.e., about 30 ml) of the liquid bleach would deliver about 10 ppm of available oxygen to the wash water. The detergent composition and liquid bleach are preferably simultaneously codispensed from a single dosing, dual compartment cup at a volume ratio of detergent to bleach of 4:1.

Claims

1. A stable liquid bleach composition comprising, by weight:

(a) from 10% to 25% of water-insoluble diperoxyacid particles of the formula $\text{HOOC}(\text{CH}_2)_n\text{COOOH}$, wherein n is from 7 to 14, said particles having an average size of from 0.5 to 15 micrometers;

(b) from 2% to 6%, on an acid basis, of a water-soluble C₁₁-C₁₃ linear alkylbenzene sulfonate surfactant;

(c) from 0% to 8%, on an acid basis, of a water-soluble cumene sulfonate;

(d) from 0% to 7% sodium or potassium sulfate; and

(e) from 40% to 78% water;

characterized in that it further contains from 5% to 15% of magnesium sulfate, provided that the total of (b) and (c) is from 3% to 14%; the total of magnesium sulfate, sodium sulfate and potassium sulfate is from 5% to 16%; and the total of (b), (c), magnesium sulfate, sodium sulfate and potassium sulfate is from 12% to 30%; the weight ratio of (a) to magnesium sulfate being less than 3:1; and said composition having a pH of from 2 to 4.5 and a viscosity of from 50 to 1000 mPa·s at 20°C, the viscosity being measured with an LTV Brookfield Viscometer, using a No. 3 spindle and a setting of 60 rpm.



2. The composition of claim 1 wherein the diperoxyacid is 1,12-diperoxydodecanedioic acid.
3. The composition of claim 1 wherein the diperoxyacid particles have an average size of from 0.5 to 10 micrometers.
4. The composition of claim 1 wherein (b) is a C₁₃ linear alkylbenzene sulfonate.
5. The composition of claim 1 wherein the composition has a viscosity of from 75 to 500 mPa·s at 20°C.
6. The composition of claim 5 wherein (b) is a C₁₃ linear alkylbenzene sulfonate.
7. The composition of claim 6 comprising from 2% to 4% of C₁₃ linear alkylbenzene sulfonate and from 1% to 6% of cumene sulfonate.
8. The composition of claim 7 comprising from 8% to 12% of magnesium sulfate and from 2% to 6% of sodium sulfate.
9. The composition of claim 8 comprising from 14% to 20% of the 1,12-diperoxydodecanedioic acid.
10. The composition of claim 9 having a viscosity of from 100 to 350 mPa·s at 20°C.

Patentansprüche

1. Stabile, flüssige Bleichmittelzusammensetzung, umfassend, bezogen auf das Gewicht:
 - (a) von 10% bis 25% an wasserunlöslichen Diperoxysäureteilchen der Formel $\text{HOOC}(\text{CH}_2)_n\text{COOH}$, worin n von 7 bis 14 beträgt, welche Teilchen eine durchschnittliche Größe von 0,5 bis 15 µm besitzen;
 - (b) von 2% bis 6%, auf einer Säurebasis, von einem wasserlöslichen, linearen C₁₁-C₁₃-Alkylbenzolsulfonat-grenzflächenaktiven Mittel;
 - (c) von 0% bis 8%, auf einer Säurebasis, von einem wasserlöslichen Cumolsulfonat;
 - (d) von 0% bis 7% Natrium- oder Kaliumsulfat; und
 - (e) von 40% bis 78% Wasser;
 dadurch gekennzeichnet, daß sie ferner von 5% bis 15% Magnesiumsulfat enthält, mit der Maßgabe, daß die Gesamtmenge von (b) und (c) von 3% bis 14% beträgt; die Gesamtmenge von Magnesiumsulfat, Natriumsulfat und Kaliumsulfat von 5% bis 16% beträgt, und die Gesamtmenge von (b), (c), Magnesiumsulfat, Natriumsulfat und Kaliumsulfat von 12% bis 30% beträgt; wobei das Gewichtsverhältnis von (a) zu Magnesiumsulfat weniger als 3:1 beträgt; und die genannte Zusammensetzung einen pH-Wert von 2 bis 4,5 besitzt und bei 20°C eine Viskosität von 50 bis 1000 mPa·s aufweist, wobei die Viskosität mit einem LTV-Brookfield-Viskosimeter unter Verwendung einer Nr. 3-Spindel und einer Einstellung von 60 UpM gemessen wird.
2. Zusammensetzung nach Anspruch 1, worin die Diperoxysäure 1,12-Diperoxydodecandisäure ist.
3. Zusammensetzung nach Anspruch 1, worin die Diperoxysäureteilchen eine durchschnittliche Größe von 0,5 bis 10 µm besitzen.
4. Zusammensetzung nach Anspruch 1, worin (b) ein lineares C₁₃-Alkylbenzolsulfonat ist.
5. Zusammensetzung nach Anspruch 1, worin die Zusammensetzung bei 20°C eine Viskosität von 75 bis 500 mPa·s besitzt.
6. Zusammensetzung nach Anspruch 5, worin (b) ein lineares C₁₃-Alkylbenzolsulfonat ist.
7. Zusammensetzung nach Anspruch 6, welche von 2% bis 4% lineares C₁₃-Alkylbenzolsulfonat und von 1% bis 6% Cumolsulfonat enthält.
8. Zusammensetzung nach Anspruch 7, welche von 8% bis 12% Magnesiumsulfat und von 2% bis 6% Natriumsulfat enthält.
9. Zusammensetzung nach Anspruch 8, welche von 14% bis 20% der 1,12-Diperoxydodecandisäure enthält.
10. Zusammensetzung nach Anspruch 9, welche bei 20°C eine Viskosität von 100 bis 350 mPa·s besitzt.

Revendications

1. Composition de blanchiment liquide stable comprenant, en poids:
 - (a) de 10% à 25% de particules de dipéroxyacide insolubles dans l'eau de formule $\text{HOOC}(\text{CH}_2)_n\text{COOH}$, dans laquelle n a une valeur de 7 à 14, lesdites particules ayant une granulométrie moyenne de 0,5 à 15 micromètres;
 - (b) de 2% à 6%, sur une base acide, d'un tensioactif alkyl(linéaire en C₁₁-C₁₃)benzènesulfonate hydrosoluble;
 - (c) de 0% à 8%, sur une base acide, d'un cumènesulfonate hydrosoluble;
 - (d) de 0% à 7% de sulfate de sodium ou de potassium; et
 - (e) de 40% à 78% d'eau;
 caractérisée en ce qu'elle contient en outre de 5% à 15% de sulfate de magnésium, à condition que le total de (b) et de (c) soit de 3% à 14%, que le total du sulfate de magnésium, du sulfate de sodium et du sulfate de potassium soit de 5% à 16% et que le total de (b), de (c), du sulfate de magnésium, du sulfate de sodium et du sulfate de potassium soit de 12% à 30%; le rapport pondéral de (a) au sulfate de magnésium étant inférieur à 3:1; et ladite composition ayant un pH de 2 à 4,5 et une viscosité de 50 à 1000



mPa·s à 20°C, la viscosité étant mesurée avec un viscosimètre Brookfield LVT, au moyen d'une broche n° 3 et d'un réglage sur 60 tours/min.

2. Composition selon la revendication 1, dans laquelle le diperacide est l'acide 1,12-diperdodécane-dioïque.

5 3. Composition selon la revendication 1, dans laquelle les particules de diperacide ont une granulométrie moyenne de 0,5 à 10 micromètres.

4. Composition selon la revendication 1, dans laquelle (b) est un alkyl(linéaire en C₁₃)benzène-sulfonate.

10 5. Composition selon la revendication 1, dans laquelle la composition a une viscosité de 75 à 500 mPa·s à 20°C.

6. Composition selon la revendication 5, dans laquelle (b) est un alkyl(linéaire en C₁₃)benzène-sulfonate.

7. Composition selon la revendication 6, comprenant de 2% à 4% d'alkyl(linéaire en C₁₃)benzènesulfonate et de 1% à 6% de cumènesulfonate.

15 8. Composition selon la revendication 7, comprenant de 8% à 12% de sulfate de magnésium et de 2% à 6% de sulfate de sodium.

9. Composition selon la revendication 8, comprenant de 14% à 20% d'acide 1,12-diperdodécane-dioïque.

10. Composition selon la revendication 9, ayant une viscosité de 100 à 350 mPa·s à 20°C.

20

25

30

35

40

45

50

55

60

65

