

United States Patent Office

3,728,266

Patented Apr. 17, 1973

1

3,728,266

LIQUID DETERGENT COMPOSITION

Yoshiaki Komeda, Tokyo, and Yunosuke Nakagawa, Koshigawa, Japan, assignors to Kao Soap Co., Ltd., Tokyo, Japan

No Drawing. Filed June 15, 1970, Ser. No. 46,485

Claims priority, application Japan, June 19, 1969,

44/48,467

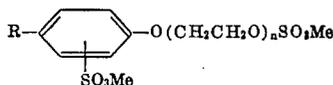
Int. Cl. C11d 1/24, 7/54

U.S. Cl. 252-95

3 Claims 10

ABSTRACT OF THE DISCLOSURE

A liquid detergent composition comprising an aqueous solution of (A) 0.1-80% by weight of a compound of the formula



wherein R is an alkyl of 8-22C, Me is an alkali metal and $40 \geq n \geq 1$, and (B) 1.0-60.0% by weight of a water soluble inorganic compound.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to a liquid detergent composition. More particularly, this invention relates to a stable liquid detergent composition comprising surfactants containing large quantities of inorganic compounds, in which the components of the detergent do not separate during long storage even under cold conditions.

Description of the prior art

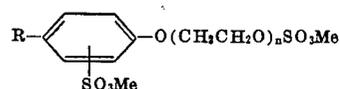
In detergent compositions for cleaning hard surfaces, inorganic compounds such as sodium hydroxide, sodium carbonate and potassium pyrophosphate have been used and surfactants have been added to the detergent compositions for improving their cleaning effect. Especially in household detergents, it is preferable to produce a detergent composition in the form of a concentrated solution containing such inorganic compounds, because the concentrated composition may be diluted by a user to the desired concentration at the time of use. However, since a surfactant will be generally salted out from a concentrated solution containing inorganic compounds, it cannot be included therein in a stable condition. Therefore,

2

a solubilizer or a so-called "hydrotrope" such as sodium p-toluenesulfonate, generally has been incorporated in such compositions, but it is uneconomical to use a large quantity of a solubilizer which has no detergency itself. Accordingly, it has been desired to provide a surfactant which will be compatible with the other detergent components and which will not be salted out even from a concentrated solution containing inorganic compounds.

SUMMARY OF THE INVENTION

The present invention provides a detergent composition prepared by dissolving in water (A) a compound of the following general Formula 1:



wherein R represents an alkyl group having 8-22 carbon atoms, Me represents an alkali metal, particularly Na, K and Li, and n is an integer of 1 to 40, and (B) one or more water-soluble inorganic compounds.

The compounds (A) having the above Formula 1 are most excellent in their solubilizing effect and detergency.

As the water-soluble inorganic compounds mentioned above, there may be used any compound which has a neutral or an alkaline property in an aqueous solution, such as sodium chloride, sodium nitrate, sodium carbonate, sodium silicate, sodium orthophosphate, sodium pyrophosphate, sodium hydroxide, sodium chlorite, sodium chlorate, sodium hypochlorite, sodium bromide, sodium sulfite, sodium metaborate, sodium sulfate or potassium pyrophosphate. An acidic compound is not desirable, since, in the presence of the same, a compound of the above general Formula 1 may be hydrolyzed.

In the following description, all references to percent (%) refer to percent by weight.

In a liquid detergent composition according to the present invention, the concentration of the surfactant having the above general Formula 1 is 0.1-80%, preferably 1-20%. Further, the operable concentration of the water-soluble inorganic compound depends on the kind thereof, but its concentration is generally 1-60%, preferably 5-40%, but the concentration thereof should be below the limit of its solubility in water.

The composition of the present invention may include, if desired or necessary, anionic surfactants, nonionic surfactants or amphoteric surfactants, such as alkylbenzene-

TABLE 1

Kinds	Concentration (percent)	Surfactant—Compound of general formula 1				State of solution	
		Carbon number of R	Integer n	Me	Amount added (percent)		
NaOH.....	20	9	4	Na	5	Transparent.	
NaOH.....	10	8	8	Na	20		
Na ₂ CO ₃	5	12	10	Na	5		
Na ₂ PO ₄	10	9	20	Na	5		
NaClO ₂	20	8	6	Na	8		
NaClO.....	6	9	4	Na	10		
NaCl.....	30	9	5	Na	10		
K ₄ P ₂ O ₇	30	12	8	K	25		
NaClO ₃	20	9	4	Na	5		
NaBO ₂	10	9	4	Na	3		
NaOH.....	20	Sodium dodecylbenzenesulfonate			1		Separated.
Na ₂ CO ₃	5	Sodium lauryl sulfate			2		
NaClO.....	6	Sodium lauryl sulfate			1		Do.
NaOH.....	10	(alkyl C ₁₂)—C ₆ H ₄ —O(CH ₂ CH ₂ O) ₄ SO ₂ Na			5		Do.
NaCl.....	5	Sodium lauryl sulfate			1		Do.
Balance—water							

sulfonates, higher alcohol sulfates, fatty acid salts, alkyl-sulfonates and also perfumes, dyes, pigments, sodium nitroacetate, sodium ethylenediamine tetraacetate, etc. The balance of the composition is water.

The effects obtainable by the present invention will be shown below by way of examples.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

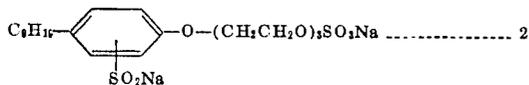
Example 1

Various surfactants as listed in Table 1 were added to aqueous solutions of various water-soluble inorganic compounds (at 5° C.) and, directly thereafter, the states of the solutions were observed. The results were as shown in Table 1.

As shown in the preceding table, compounds of the general Formula 1 of the present invention are dissolved in concentrated aqueous solutions of various water-soluble inorganic compounds to produce transparent solutions, whereas separation is observed when the other anionic surfactants are used.

EXAMPLE 2

Formulation:	Percent
Sodium metasilicate	1
NaOH	5

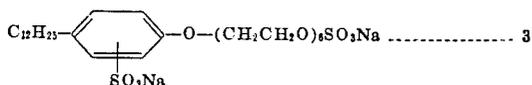


Water

The liquid detergent composition of the above formulation is transparent and undergoes no change in quality after storage for one year at 5° C. and it is suitable for cleaning a solid surface.

EXAMPLE 3

Formulation:	Percent
NaOCl	6
NaCl	5
NaOH	1



Water

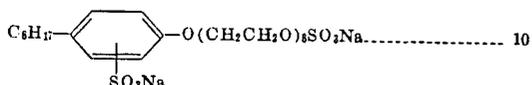
The product of the above composition is a penetrating bleaching agent in the form of a transparent yellow liquid. Storage of the product for 3 months at -5° C. caused neither turbidity nor the formation of a precipitate.

The available chlorine after storage for one year at 20° C. was 4.5%. On the other hand, the available chlorine of a product of the same composition but not containing the surfactant, tested simultaneously, was 4.6%.

Accordingly, this product is suitable as a bacteriocidal detergent for diapers.

EXAMPLE 4

Formulation:	Percent
Na ₂ SO ₃	10



Water

A product of the above composition is a transparent liquid suitable as a reductive bleaching detergent.

EXAMPLE 5

Detergent components	Composi- tion A (percent)	Composi- tion B (percent)
5 Potassium dodecylbenzenesulfonate	10	10
Potassium pyrophosphate	30	30
$C_{11}H_{23}-\text{C}_6\text{H}_4-\text{SO}_2\text{K}-\text{O}-(\text{CH}_2\text{CH}_2\text{O})_3\text{SO}_2\text{K}$	10	10
10 Potassium p-toluenesulfonate		10
Potassium metasilicate	4	4
Fluorescent dye	0.5	0.5
Water	Balance	Balance

Storage for 6 months at 5° C. of these compositions caused no precipitation in the composition A which remained transparent, but separation was observed in the composition B.

The detergency of both of these compositions were determined under the following conditions.

Test conditions

Soiled cloth: Soiled cloth having a reflectivity of $30 \pm 2\%$ (MgO) was prepared with stains of the following components—

Beef tallow	1%.
Liquid paraffin	3%.
Carbon	0.6%.
Carbon tetrachloride	Balance.

Testing machine: Terg-O-Meter

Method of Washing:

Water hardness	4° DH (Ca/Mg=3/1).
Washing temperature	15° C., 30° C.
Rotation	100 r.p.m.
Washing time	10 mins.
Rinsing	Twice, each 5 mins.
Bath ratio	1:30.

Determination of detergency:

$$D = \frac{R_w - R_s}{R_0 - R_s} \times 100\%$$

R_w : Reflectivity of the soiled cloth after washing

R_s : Reflectivity of the soiled cloth before washing

R_0 : Reflectivity of the original white cloth

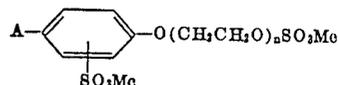
The tests were carried out with 6 sheets of soiled cloths and the mean detergency value was obtained from four values excluding the highest and the lowest values.

The results of the determination of detergency were as shown in the following table.

Concentration of detergent, percent	15° C.		30° C.	
	Composi- tion A	Composi- tion B	Composi- tion A	Composi- tion B
55 0.1	45	30	50	41
0.2	58	43	65	49

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A transparent liquid detergent composition consisting essentially of an aqueous solution of (A) from 0.1 to 80% by weight of a surfactant of the formula:



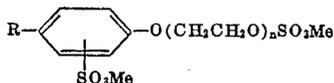
70 wherein R represents an alkyl group having 8–22 carbon atoms, Me represents an alkali metal and n is an integer of 1 to 40, and (B) from 1.0 to 60% by weight of at least one water-soluble inorganic compound selected from the group consisting of sodium chloride, sodium nitrate, sodium carbonate, sodium silicate, sodium ortho-

5

phosphate, sodium pyrophosphate, sodium hydroxide, sodium bromide, sodium sulfate, sodium metaborate and potassium pyrophosphate.

2. The liquid detergent composition as claimed in claim 1, wherein the concentration of said surfactant is 1 to 20% by weight and the concentration of said water-soluble inorganic compound is 5 to 40% by weight.

3. A transparent liquid detergent composition consisting essentially of an aqueous solution of (A) from 0.1 to 80% by weight of a surfactant of the formula:



wherein R represents an alkyl group having 8-22 carbon atoms, Me represents an alkali metal and n is an integer of $40 \geq n \geq 1$, and (B) from 1.0 to 60% by weight of at least one water-soluble inorganic compound selected from the group consisting of sodium chlorite, sodium chlorate, sodium sulfite and sodium hypochlorite.

6

References Cited

UNITED STATES PATENTS

2,970,963	2/1961	Walker et al.	252-161 X
3,393,154	6/1968	Treitler	252-161
2,956,026	10/1960	Lew	252-161
3,130,164	4/1964	Best.	

FOREIGN PATENTS

6709714	1/1968	Netherlands	252-161
550,740	9/1956	Belgium	252-138

OTHER REFERENCES

Gilbert et al.: Sulfation with Sulfur Trioxide, article in Journal of American Oil Chemists Society, vol. 37, 1960, pp. 298-300.

HERBERT B. GUYNN, Primary Examiner

U.S. Cl. X.R.

252-99, 532, 534, 546, 551, 553, Dig. 14