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3,591,509

LIQUID HARD SURFACE CLEANING COMPOSITIONS

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6 Claims

ABSTRACT OF THE DISCLOSURE

Liquid detergent hard surface cleaning compositions containing 0.25% to 4% of a water-soluble synthetic detergent; 0% to 6% of a water-soluble builder or mixture of builders; 1% to 10% of an organic solvent or mixture of solvents; 0.10% to 0.5% of a water-soluble carboxymethylcellulose having a degree of substitution of from about 1 to about 2 and a degree of polymerization from about 1,000 to about 3,000; and water.

BACKGROUND OF THE INVENTION

This invention relates to liquid detergent compositions. More particularly, this invention relates to liquid detergent compositions suitable for hard surface cleaning in a no-rinse method with improved cleaning and without the usual resulting filming or streaking problem.

In general, liquid detergent compositions are well known in the art and many such compositions have been used in the past for cleaning hard surfaces such as glass, painted walls, woodwork and the like. Generally when such compositions are applied to the above surfaces without a subsequent rinse, they leave a film after their cleaning function has been performed. This residual film, when it contains an organic detergent, can act almost as a trap and collects dirt. The surface thus cleaned with such a composition does not appear clean and can become dirty again even more rapidly than the same surface would become dirty in the absence of the residual film.

Many attempts have been made to produce a so-called volatile detergent composition. Theoretically, such a volatile composition when applied to a surface would perform its cleaning function and then completely evaporate, leaving the clean surface free of any residual film which would enhance the subsequent collection of dirt or soil. Volatile compositions have been prepared in the past which will substantially evaporate after use leaving the surface devoid of any noticeable residual film but, in general, such detergent compositions will not adequately or sufficiently clean the surface as desired or present other negatives such as inflammability or noxious odor.

One of the principal objects of the present invention is to provide a novel liquid detergent composition which effectively cleans hard surfaces when used in a no-rinse method without leaving an objectionable residual film.

It is a further object of the present invention to provide liquid detergent hard surface cleaner compositions containing specific carboxymethylcelluloses in small amounts which aid the composition in staying in place when sprayed on vertical surfaces until the composition and any dirt on the surface can be wiped off.

Other objects and advantages of the present invention will be readily apparent to one skilled in the art from the following description.

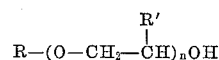
SUMMARY OF THE INVENTION

The objects of the present invention are achieved by a liquid detergent composition consisting essentially of an aqueous medium containing a synthetic detergent; a

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builder or combination of builders; an organic solvent or mixture of organic solvents which are sufficiently hydrophobic to dissolve oily soils, e.g., grease and carboxymethylcelluloses having a high degree of substitution and degree of polymerization.

The present invention consists of a novel liquid detergent composition consisting essentially of from about 0.25% to about 4.0% by weight of a compatible water-soluble synthetic detergent; from about 0% to about 6.0% by weight of a water-soluble detergency builder, e.g., a builder selected from the group consisting of water-soluble polyphosphonates, tripolyphosphates, orthophosphates, pyrophosphates and aminopolycarboxylates and mixtures thereof; from about 1.0% to about 10.0% by weight of an organic solvent or mixture of solvents of the general formula



wherein R is a straight chain alkyl group containing from about 1 to about 4 carbon atoms, R' is selected from the group consisting of H and CH₃ and n is an integer of from 1 to about 3; from about 0.10% to about 0.5% of a water-soluble carboxymethylcellulose having a degree of substitution of from about 1 to about 2 and a degree of polymerization of from about 1,000 to about 3,000.

Among the detergents which have been found useful as the active detergent agent in the compositions of the present invention and which are clearly within the contemplation of this invention are the following examples:

(A) Anionic synthetic detergents: This class of synthetic detergents includes alkali metal, ammonium and substituted ammonium salts of organic sulfuric reaction products having in their molecular structure an alkyl radical, either straight chain or branched chain, containing from about 8 to about 18 carbon atoms, preferably from about 10 to about 14 carbon atoms and a radical selected from the group consisting of sulfonic acid and sulfuric acid ester radicals. Important examples of the synthetic detergents which form a part of the preferred compositions of the present invention are the following anionic detergents as the alkali metal (e.g., sodium and potassium), ammonium and substituted ammonium (e.g., lower alkanol ammonium) salts: alkyl sulfates, especially those containing from about 8 to about 12 carbon atoms and those obtained by sulfating the higher alcohols produced by reducing the glycerides of coconut oil, linear alkylbenzene sulfonates in which the alkyl radical contains from about 6 to about 18 carbon atoms, especially those containing from about 6 to about 8 carbon atoms, and from about 10 to about 14 carbon atoms; sulfuric acid esters of polyhydric alcohols incompletely esterified with higher fatty acids; higher fatty acid esters of low molecular weight alkanol sulfonic acids; higher fatty acid ethanalamide sulfates; higher fatty acid amides of amino alkyl sulfonic acids; sulfated reaction products of long chain alcohols containing from about 8 to about 18 carbon atoms with from 1 to about 15 moles of ethylene oxide per mole of alcohol, especially those sulfated reaction products of C₈ to C₁₆ alcohols with about 3 moles of ethylene oxide per mole of alcohol; alkyl sulfonates wherein the alkyl group contains from about 8 to about 18 carbon atoms; and the novel water-soluble salts of C₁₀—C₂₀ sulfonated olefins of U.S. Pat. 3,332,880, issued July 25, 1967, to Kessler et al, especially the C₁₄ sulfonated olefin.

(B) Nonionic synthetic detergents: This class of synthetic detergents may be broadly defined as compounds, aliphatic or alkyl aromatic in nature which do not ionize in water solution.

For example, a well known class of nonionic synthetic detergents is made available on the market under the trade name of "Pluronic." These compounds are formed by condensing ethylene oxide with a hydrophobic base formed by the condensation of propylene oxide with propylene glycol. The hydrophobic portion of the molecule which, of course, exhibits water insolubility has a molecular weight of from about 1200 to 2500. The addition of polyoxyethylene radicals to this hydrophobic portion tends to increase the water solubility of the molecule as a whole and the liquid character of the product is retained up to the point where polyoxyethylene content is about 50% of the total weight of the condensation product.

Other suitable nonionic synthetic detergents include:

(1) The polyethylene oxide condensates of alkylphenols, e.g., the condensation products of alkylphenols or dialkylphenols wherein the alkyl group contains from about 6 to 12 carbon atoms in either a straight chain or branched chain configuration, with ethylene oxide, the said ethylene oxide being present in amounts equal to 10 to 25 moles of ethylene oxide per mole of alkylphenol. The alkyl substituent in such compounds may be derived from polymerized propylene, diisobutylene, n-octene, or n-nonene, for example.

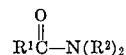
(2) Those derived from the condensation of ethylene oxide with the product resulting from the reaction of propylene oxide and ethylenediamine. For example, compounds containing from about 40% to about 80% polyoxyethylene by weight and having a molecular weight of from about 5000 to about 11,000 resulting from the reaction of ethylene oxide groups with a hydrophobic base constituted of the reaction product of ethylenediamine and excess propylene oxide, said base having a molecular weight of the order of 2500 to 3000, are satisfactory.

(3) The condensation product of aliphatic alcohols having from about 6 to about 18 carbon atoms, and especially from about 8 to about 10 carbon atoms in a straight chain configuration with ethylene oxide, e.g., from 6 to 30 moles of ethylene oxide per mole of alcohol. Specific examples suitable for use in this invention include a decyl alcohol/ethylene oxide condensate containing an average of 9 moles of ethylene oxide per mole of decyl alcohol and a coconut alcohol ethylene oxide condensate containing an average of 20 moles of ethylene oxide per mole of alcohol.

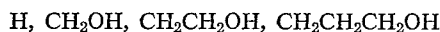
(4) Long chain tertiary amine oxides corresponding to the following general formula, $RR'R''N \rightarrow O$ wherein R is an alkyl, alkenyl or monohydroxyalkyl radical ranging from 8 to 18 carbon atoms in chain length and R' and R'' are each alkyl or monohydroxyalkyl groups containing from 1 to 3 carbon atoms. The arrow in the formula is a conventional representation of a semi-polar bond. Examples of amine oxides suitable for use in this invention include dimethyldodecylamine oxide, dimethyloctylamine oxide, dimethyldodecylamine oxide, dimethyltetradecylamine oxide, dimethylhexadecylamine oxide;

(5) Long chain tertiary phosphine oxides corresponding to the following general formula $RR'R''P \rightarrow O$ wherein R is an alkyl, alkenyl or monohydroxyalkyl radical ranging from 8 to 18 carbon atoms in chain length, and R' and R'' are each alkyl or monohydroxyalkyl groups containing from 1 to 3 carbon atoms. The arrow in the formula is a conventional representation of a semi-polar bond. Examples of suitable phosphine oxides are: dimethyloctylphosphine oxide, dimethyldodecylphosphine oxide, dimethyldodecylphosphine oxide, dimethyltetradecylphosphine oxide, ethylmethyltetradecylphosphine oxide, cetyl-dimethylphosphine oxide, dimethylstearylphosphine oxide, cetyl-ethylpropylphosphine oxide, diethyl-dodecylphosphine oxide, diethyltetradecylphosphine oxide, dipropyl-dodecylphosphine oxide, bis-(hydroxymethyl)dodecylphosphine oxide, bis-(2-hydroxyethyl)dodecylphosphine oxide, (2-hydroxypropyl)methyltetradecylphosphine oxide, dimethyl-oleylphosphine oxide, and dimethyl-(2-hydroxydodecyl)phosphine oxide; and

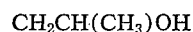
(6) Lower chain alcohol fatty acid or fatty ester amides corresponding to the general formula



wherein R¹ contains from about 6 to about 18 carbon atoms and R² is selected from the group consisting of



and



(C) Zwitterionic synthetic detergents: This class of synthetic detergents can be broadly described as derivatives of aliphatic quaternary ammonium compounds, in which the aliphatic radical may be straight chain or branched and wherein one of the aliphatic substituents contains from about 8 to about 18 carbon atoms, preferably from about 10 to about 14 carbon atoms and one contains an anionic water solubilizing group, e.g., carboxy, sulfo or sulfato. Examples of the preferred compounds falling within this definition are described in German Pat. 1,018,421 and U.S. Pats. 2,082,275, 2,702,279 and 2,255,082. A specific preferred example is 3-(N,N'-dimethyl-N-decylammonio)-2-hydroxypropane-1-sulfonate. When the solvent is either propylene glycol butoxy ether, propylene glycol isobutoxy ether, dipropylene glycol butoxy ether or mixtures thereof. Another preferred example is 3-(N,N'-dimethyl-N-decylammonio) - propane-1-sulfonate wherein "coconut-alkyl" has the following chain length distribution: 2% C₁₀, 66% C₁₂, 23% C₁₄ and 9% C₁₆; and 3-(N,N'-dimethyl-N-alkylammonio)-2-hydroxy-propane-1-sulfonate wherein the alkyl group has an average chain length of C₁₀.

The anionic, nonionic and zwitterionic detergents mentioned above can be used singly or in combination in the practice of the present invention. The synthetic detergent comprises from about 0.25% to about 4.0% by weight of the total composition. If more than about 4.0% is used an undesired streaking and filming problem results and if less than about 0.25% is used the desired level of cleaning will not be achieved. A preferred range of from about 0.50% to about 2.0% by weight of a synthetic detergent as described above will yield the best results of the invention.

Preferred detergent compositions are disclosed in the copending application of Harry J. Aubert and James A. Hellyer, Ser. No. 683,111, filed Nov. 15, 1967, entitled Liquid Hard Surface Cleaning Compositions and the copending applications of William E. Zenk entitled Liquid Hard Surface Cleaning Compositions filed concurrently herewith, Ser. No. 763,949 filed, Sept. 30, 1968.

The builders which can be utilized in the practice of the invention to give the desired cleaning performance without attendant excessive filming and streaking problems are selected from the group consisting of water-soluble polymeric carboxylates, polyphosphonates, tripolyphosphates, orthophosphates, borates, pyrophosphates, and amino polycarboxylates.

Suitable builders include the alkali metal (e.g., sodium and potassium) and ammonium (including substituted ammoniums, e.g., triethanolammonium) amino polycarboxylates, organic polyphosphonates, polymeric carboxylates, pyrophosphates, orthophosphates, and tripolyphosphates. Suitable amino polycarboxylates are those described in U.S. Pat. 3,329,617 and 3,336,233. Suitable polyphosphonates are those described in U.S. Pat. 3,329,617; 3,336,233; 3,332,880; 3,213,030; 3,400,148; 3,400,176; and 3,400,151; and copending U.S. applications: Roy, Ser. No. 266,055, filed Mar. 18, 1963; Roy, Ser. No. 493,925, filed Mar. 18, 1963; Quimby, Ser. No. 517,073, filed Dec. 28, 1965; Quimby and Prentice, Ser. No. 587,417, filed Oct. 18, 1966; Quimby, Ser. No. 605,606, filed Dec. 29, 1966; Curry, Ser. No. 717,999, filed Apr. 1, 1968; Nicholson and Campbell, Ser. No. 694,002, filed Dec. 27, 1967; Nicholson and Campbell, Ser. No. 694,003, filed Dec. 27, 1967; and Prentice and

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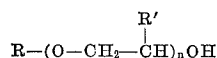
Quimby, Ser. No. 694,106, filed Dec. 28, 1967. Suitable polymeric carboxylates are disclosed in U.S. Pat. 3,308,067. All of the above patents and applications are incorporated herein by reference. Preferred builders are sodium nitrilotriacetate, potassium pyrophosphate, potassium tripolyphosphate and sodium or potassium ethane-1-hydroxy-1,1-diphosphonate and its derivatives.

A preferred mixture of builders is the combination of a water-soluble ethane-1-hydroxy-1,1-diphosphonate and water-soluble nitrilotriacetate, preferably the sodium salts.

Other suitable builders are disclosed hereinafter in the examples.

The builder or builder mixture comprises from about 0 to about 6% by weight of the total composition if more than about 6% by weight is used, then an undesired filming and streaking problem is observed. If less than about 1% by weight is used the builder will not be able to contribute to the desired cleaning results of the invention. If about 1.5% to 2.5% builder by weight of the total composition is used the best cleaning and non-filming results of the invention are achieved.

The solvents which can be used, either alone or in combination, in the practice of this invention to aid in grease removal are of the general formula:



wherein R is a straight chain alkyl group containing from about 1 to about 4 carbon atoms, R' is selected from the group consisting of H and CH₃ and n is from 1 to about 3.

The solvent or solvent mixture of this invention comprises from about 1% to about 10% by weight of the total composition. If more than about 10% by weight is used, the resulting solvent based cleaner is undesirably capable of removing paint and finishes from the surfaces it is used on. Furthermore, such large amounts of solvents present an odor problem. If less than about 1% by weight is used, then the desired cleaning function is not adequately performed. A preferred range of solvent is from about 4% to about 8% by weight.

When certain solvents within the general formula above are used, e.g., propylene glycol butoxy ether, propylene glycol isobutoxy ether, dipropylene glycol butoxy ether, mixtures thereof, etc., a hydrotrope can be employed to insure complete solubility. Among the hydrotropes that can be utilized are sodium, potassium and ammonium toluene sulfonates, xylene sulfonates, and cumene sulfonates in an amount ranging from .5% to 3.0% of the composition.

When propylene glycol butoxy ether, propylene glycol isobutoxy ether, dipropylene glycol butoxy ether, mixtures thereof, etc. are used as the solvent, care must be taken in selecting a compatible detergent, e.g., the alkali metal (e.g., sodium and potassium), ammonium and substituted ammonium (e.g., lower alkanol ammonium) hexyl, octyl, nonyl, decyl, undecyl and dodecyl sulfates; linear alkylbenzene sulfonates in which the alkyl radical contains from about 6 to about 8 carbon atoms, 3-[N,N'-dimethyl - N - decylammonio]-2-hydroxypropane-1-sulfonate, and 2-(N,N',N''-trimethylammonio)decanoate, in order to achieve the desired results of the present invention.

When many of the above compositions are sprayed onto a vertical wall either with a mechanical sprayer or an aerosol, they tend to run down the surface before they can be wiped off. This tendency is undesirable since it can spread the stain and require excessive wiping. It has been discovered that the addition of from about 0.10% to about 0.5% of a water-soluble (e.g. sodium, potassium, ammonium, or triethanolammonium) carboxymethylcellulose having a degree of substitution of from about 1 to about 2 and a degree of polymerization of from about 1,000 to about 3,000 to the above described compositions will improve the ability of the compositions to hold on vertical surfaces when sprayed onto said vertical surfaces

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from a mechanical sprayer or aerosol. The carboxymethylcellulose is compatible with the compositions and can easily be dissolved in them to prepare a single phase system. Carboxymethylcelluloses having lower degrees of polymerization will not be sufficiently effective. Amounts of the preferred carboxymethylcellulose in excess of about 0.5% tend to adversely affect the spray pattern so that the surface is covered incompletely. When no builder is used, the level of carboxymethylcellulose should be at least about 0.35% and preferably about 0.4%. Within the limits set forth herein, the composition will have a good spray pattern when sprayed onto a vertical surface and will remain for a sufficient time to permit the user to wipe the surface clean.

Miscellaneous materials such as coloring agents, aerosol propellants, perfumes, sodium borate decahydrate (borax) as a pH buffer, and other materials which are well known as constituents in liquid detergent compositions and which are compatible in the formulations of the present invention can also be present in minor amounts.

The various constituents of the liquid detergent compositions of the present invention can be admixed in any sequence to achieve the desired objects as stated above. It is preferred, however, for ease of solubility, to add the components in the following order at temperatures of between about 40° F. and about 100° F. with constant agitation: water, builder, solvents, detergent and, if any, the optional components.

The liquid detergent compositions of this invention can be utilized either full strength or in dilute solutions. A preferred method of application is in the form of a spray or aerosol for small spots and for small spot cleaning, full strength is recommended. When one wishes to apply the compositions over large surfaces utilizing a sponge, mop, or brush, then dilution is suggested although such is up to the individual situation's requirements.

The following examples illustrate in detail the manner in which the invention can be practiced. However, the invention is not confined to the specific limitations set forth in the individual examples but, rather, to the scope of the appended claims.

PREFERRED EMBODIMENTS

Example I

A liquid detergent composition was prepared from the following ingredients:

	Percent
Sodium linear alkyl benzene sulfonate (alkyl chain length averaging 11 carbon atoms) -----	2.0
Diethylene glycol n-butyl ether -----	4.0
Ethylene glycol n-butyl ether -----	2.0
Trisodium salt of nitrilotriacetic acid monohydrate -----	1.0
Ethane - 1 - hydroxy-1,1-diphosphonic acid -----	0.76
Sodium carboxymethylcellulose (D.P.—1,000; D.S.—1.2) -----	0.25
Perfume -----	0.35
Sodium hydroxide -----	0.7
Soft water -----	Balance to 100

This composition was a stable liquid composition with a pH of about 12. At this pH in the composition of this Example I and succeeding examples, the diphosphonic acid is neutralized to the tetra sodium salt by the sodium hydroxide. This composition, when sprayed on a vertical surface, gives a good pattern and does not run down immediately, enabling the user to wipe the surface clean.

Substantially the same results in cleaning vertical surfaces without the product running down are obtained with the compositions of Example I when any of the following surfactants are substituted on an equal weight basis for the sodium linear alkyl benzene sulfonate in Example I, ("coconut" as used below has the following chain length distribution: 2% C₁₀, 66% C₁₂, 23% C₁₄, and 9% C₁₆).

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(1) Sodium, potassium, ammonium and substituted ammonium

- (a) alkyl sulfates wherein the alkyl is derived from coconut oil;
- (b) alkyl sulfonates prepared by sulfonating alpha olefins containing an average of about 12 carbon atoms;
- (c) alkyl benzene sulfonates containing alkyl chains containing an average of about 11 carbon atoms;
- (d) fatty acyl isethionates wherein the fatty acyl groups are derived from coconut oil;
- (e) fatty alcohol ethylene oxide sulfates wherein the alcohol radical is derived from coconut, and where there are about 3 moles of ethylene oxide per mole of fatty alcohol;
- (f) N-coconut fatty acyl taurides;
- (g) coconut fatty acid monoglyceride sulfates;
- (h) coconut fatty acid diethanolamide sulfates;
- (i) coconut fatty acid diethanolamides;
- (j) olefin sulfonates obtained from the SO₃ sulfonation of dodecene;
- (k) octyl sulfates;
- (l) decyl sulfates;
- (m) hexylbenzene sulfonates;
- (n) octylbenzene sulfonates;
- (o) heptylbenzene sulfonates;
- (p) nonyl sulfates;
- (q) olefin sulfonates obtained by sulfonating tetradecene with SO₃ and
- (r) random octylbenzene sulfonates.

(2)

- (a) the condensation product of ethylene oxide with a condensation product of propylene oxide and propylene glycol, the ethylene oxide constituting 50% of the total weight of the condensation product and the total molecular weight of the condensation product being about 3600;
- (b) the condensation product of ethylene oxide with a condensation product of propylene oxide and ethylene diamine, the ethylene oxide constituting 50% of the total weight of the condensation product and the total molecular weight of the condensation product being about 7500;
- (c) alkyl phenol ethylene oxide reaction product wherein the alkyl group contains about 12 carbon atoms and there are approximately 10 moles of ethylene oxide per mole of alkyl phenol; the condensation product of one mole of alcohol derived from coconut oil and about 10 moles of ethylene oxide.
- (d) decyldimethylamine oxide;
- (e) decyldimethylphosphine oxide;
- (f) 3 - (N,N - dimethyl - N-decylammonio)-2-hydroxypropane-1-sulfonate;
- (g) 3 - (N,N - dimethyl - N - coconutalkylammonio)-2-hydroxypropane-1-sulfonate; and

mixtures thereof.

Example II

The following liquid detergent composition is prepared.

	Percent
Sodium linear alkyl benzene sulfonate (alkyl chain length averaging 7 carbon atoms) -----	2.0
Diethylene glycol n-butyl ether -----	4.0
Ethylene glycol n-butyl ether -----	2.0
Ethane-1-hydroxy-1,1-diphosphonic acid -----	1.5
Perfume -----	.35
Potassium carboxymethylcellulose (D.P.—2,400; D.S.—1.2) -----	0.25
Sodium hydroxide -----	1.5
Soft water -----	Balance to 100

The composition is a stable liquid composition with a pH of 12. When the composition is sprayed on smooth

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vertical surfaces a desired level of cleaning is obtained without the product running down the surface.

Example III

The following liquid detergent composition is prepared.

	Percent
Sodium decyl sulfate -----	2.0
2-hydroxy-3-butoxypropane(Propasol B) -----	6.0
Ethane-1-hydroxy-1,1-diphosphonic acid -----	0.76
Trisodium salt of nitrilotriacetic acid monohydrate -----	1.0
Potassium cumene sulfonate -----	2.0
Sodium carboxymethylcellulose (D.P.—2,000; D.S. 1.6) -----	.2
Perfume -----	.35
Sodium hydroxide -----	.7
Soft water -----	Balance to 100

The composition is a stable liquid composition with a pH of 12. When this composition is sprayed on smooth vertical panels a desirable level of cleaning is achieved without any significant running of the formula.

Example IV

The following liquid detergent composition is prepared:

	Percent
3(N-N-dimethyl-N-decyl alkylammonio) - 2 - hydroxypropane-1-sulfonate -----	2.0
2-hydroxy-3-butoxypropane -----	6.0
Ethane-1-hydroxy-1,1-diphosphonic acid -----	0.76
Trisodium salt of nitriloacetic acid -----	1.0
Potassium toluene sulfonate -----	2.0
Sodium carboxymethylcellulose (D.P.—1800; D.S. —1.5) -----	.4
Perfume -----	.35
Sodium hydroxide -----	.7
Soft water -----	Balance to 100

This composition is a stable liquid composition with a pH of about 12. When sprayed on smooth vertical surfaces, this composition cleans well without significant running.

The following table shows the comparison of different chain length sodium alkyl sulfates.

	Coconut ¹	C ₁₀	C ₈	C ₆
Cleaning -----	Basis.	Equal.	Equal.	Equal.
Filming -----	Light moderate.	Light.	Trace, light.	

¹ Coconut refers to the following chain length distribution: 2% C₁₀, 66% C₁₂; 23% C₁₄; and 9% C₁₆. C₈ alkyl sulfate is preferred and C₆ and C₈ alkyl sulfates are next best.

Similar tests with 3-[N,N'-dimethyl-N-decylammonio]-2-hydroxypropane - 1 - sulfonate (C₁₀HAPS) and ammonium coconut¹ alkyl polyethoxylate (3 moles) (NH₄AE₃S) gave the following results.

	C ₁₀ HAPS	C ₁₂ HAPS	NH ₄ AE ₃ S	Sodium octylbenzene sulfonate
Cleaning -----	Equal.		Worse.	Basis.
Filming -----	Trace, light.	Heavy.	Light, moderate.	Light.

Similar results are obtained when 1% detergent is used instead of 2%.

The C₁₀HAPS formula did not immediately run down when sprayed from a mechanical sprayer onto a vertical surface.

¹ See footnote in table immediately above.

The following compositions all have the general formula:

	Percent
Water soluble synthetic detergent	2.0
Propylene glycol isobutoxy ether	3.0
Dipropylene glycol butoxy ether	3.0
Builder	2.0
Sodium carboxymethyl cellulose (D.P. 2,000; D.S. -1.4)	0.3
Hydrotrope	2.0
Water	Balance

substitution of from about 1 to about 2 and a degree of polymerization of from about 1000 to about 3000; and

(E) the balance water.

2. The composition of claim 1 wherein the water-soluble synthetic detergent is sodium linear alkylbenzene sulfonate wherein the alkyl group contains from about 6 to about 8 carbon atoms.

3. The composition of claim 1 wherein the builder is sodium ethane-1-hydroxy-1,1-diphosphonate.

4. The composition of claim 1 wherein the builder is a mixture of sodium ethane-1-hydroxy-1,1-diphosphonate and sodium nitrilotriacetate.

Composition	Detergent	Builder	Hydrotrope
1.....	Potassium hexylbenzene sulfonate	Sodium tripolyphosphate	Sodium toluene sulfonate.
2.....	Sodium octylbenzene sulfonate	Potassium ethane-1,1,2-triphosphonate	Potassium toluene sulfonate.
3.....	Ammonium nonylbenzene sulfonate	Triethanolammonium poly(itaconate-acrylate) (4:1 on a molar basis) (specific viscosity of 1% by weight, in dimethyl formamide at room temperature, -0.40) (equivalent weight, 65.8).	Ammonium toluene sulfonate.
4.....	Potassium hexylbenzene sulfonate	Potassium ethane-1-hydroxy-1,1,2-triphosphonate.	Sodium xylene sulfonate.
5.....	Sodium r-octylbenzene sulfonate	Ammonium ethane-2-hydroxy-1,1,2-triphosphonate.	Potassium xylene sulfonate.
6.....	Sodium r-hexylbenzene sulfonate	Tripotassium ethane-1-hydroxy-1,1-diphosphonate.	Ammonium xylene sulfonate.
7.....	Potassium nonyl sulfate	Sodium nitrilotriacetate	Sodium benzene sulfonate.
8.....	Sodium 4-nonyl sulfate	Potassium pyrophosphate	Potassium benzene sulfonate.
9.....	Sodium olefin sulfonate	Ammonium methylene-diphosphonate	Ammonium benzene sulfonate.
10.....	Potassium salt of the detergent of Composition 9.	Sodium ethylene-1,1-diphosphonate	Sodium cumene sulfonate.
11.....	Sodium nonyl polyethoxylate (4 moles) sulfate.	Sodium N-(2-hydroxy-ethyl)-ethylenediaminetriacetate.	Potassium cumene sulfonate.
12.....	Potassium decyl polyethoxylate (2 moles) sulfate.	Potassium N-(2-hydroxyethyl-nitrilotriacetate).	Triethanolammonium cumene sulfonate.
13.....	Sodium decyl sulfate	Potassium isopropylidene diphosphonate	Triethanolammonium benzene sulfonate.
14.....	Potassium undecyl sulfate	Ammonium ethylidene diphosphonate	Triethanolammonium xylene sulfonate.
15.....	Potassium tridecyl sulfate	Potassium hydroxymethanediphosphonate	Triethanolammonium toluene sulfonate.
16.....	1:1 mixture by weight of sodium hexylbenzene sulfonate and sodium octyl sulfate.	1:1 mixture by weight of ammonium propane-1,1,3,3-tetrakisphosphonate and ammonium propane-1,2,2,3-tetrakisphosphonate.	Morpholinium cumene sulfonate.
17.....	1:1 mixture by weight of sodium octylbenzene sulfonate and sodium decyl sulfate.	Ammonium propane-1,1,2,3-tetrakisphosphonate.	Morpholinium xylene sulfonate.
18.....	3-[N,N'-dimethyl-N-decylammonio]-2-hydroxypropane-1-sulfonate.	1:1 mixture by weight of sodium carbonyl-diphosphonate and sodium hexametaphosphonate.	Morpholinium toluene sulfonate.
19.....	do	Sodium orthophosphate	Sodium cumene sulfonate.

In addition to the preferred embodiments described herein, other arrangements and variations within the spirit and scope of the invention and the appended claims will occur to those skilled in the art.

What is claimed is:

1. A novel liquid detergent hard surface no-rinse cleaning composition consisting essentially of:

(A) from about 0.25% to about 4.0% by weight of a compatible short chain water-soluble synthetic detergent selected from the group consisting of: (1) 3-(N,N'-dimethyl - N - decylammonio)-2-hydroxypropane - 1 - sulfonate, (2) 2(N,N',N''-trimethylammonio) decanoate, (3) and alkali metal straight chain alkylbenzene sulfonates wherein said alkyl group contains from about 6 to about 8 carbon atoms,

(B) from about 1% to about 6.0% by weight of a water-soluble detergency builder selected from the group consisting of water-soluble polyphosphonates, tripolyphosphonates, orthophosphates, borates, pyrophosphates, polymeric carboxylates, and amino polycarboxylates and mixtures thereof;

(C) from about 1.0% to about 10% by weight of an organic solvent or mixture of solvents selected from the group consisting of propylene glycol butoxy ether, propylene glycol isobutoxy ether, and dipropylene glycol butoxy ether, and mixtures thereof;

(D) from about 0.1% to about 0.5% of a water-soluble carboxymethylcellulose having a degree of

5. The composition of claim 1 wherein the builder is sodium orthophosphate.

6. The composition of claim 1 containing no builder and at least about 0.35% carboxymethylcellulose.

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U.S. Cl. X.R.

252—138, 152, 153, 154, 161

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,591,509 Dated July 6, 1971

Inventor(s) Lawrence Roy Parks and William Edward Zenk

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

At column 2, line 25, "carboxymethylcelluose should read -- carboxymethylcellulose --.

In Example 4, column 8, line 31, "nitriloacetic" should read -- nitrilotriacetic --.

In claim 1, column 9, line 65, "tripolyphosphonates" should read -- tripolyphosphates --.

Signed and sealed this 18th day of January 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents