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(54) Concentrated hard-surface cleaning compositions.

(57) Concentrated hard surface cleaning compositions being free of terpene solvents, and containing a narrowly-defined solvent derived from propylene glycol, are disclosed.

The compositions herein show excellent cleaning and shine performance, and are not aggressive to cleaned surfaces and packaging materials.

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CONCENTRATED HARD-SURFACE CLEANING COMPOSITIONS

Technical Field

The present invention relates to concentrated hard-surface cleaning compositions, which show excellent cleaning on both kitchen and bathroom soils, excellent shine performance, and are not aggressive to surfaces to be cleaned therewith and packaging materials.

These compositions are substantially free of terpene solvents, and contain a narrowly-defined solvent derived from propylene glycol.

Background

It is well-known to formulate hard-surface cleaning compositions containing solvents.

In particular, compositions containing a binary solvent system constituted of terpenes and polar solvents such as benzyl alcohol and butyl carbitol have been disclosed in European Patents 0 040 882 and 0 080 749.

It has become desirable, however, to replace terpenes by solvents which are fully compatible with all types of surfaces to be cleaned therewith, and packaging materials, and at the same time exhibit good cleaning properties.

There is also a need for concentrated hard-surface cleaners containing organic solvents, and relatively low levels of hydrotropes, since hydrotropes such as cumene sulfonate can be detrimental to performance, especially shine.

It has now been found that liquid, concentrated cleaner compositions can be formulated, which are substantially free of terpene solvent, and show remarkable cleaning efficiency on both kitchen and bathroom soils, shine performance and surface-compatibility. Such compositions contain a narrowly-defined solvent derived from propylene glycol, and do not contain an excessive level of hydrotrope.

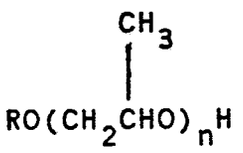
EP-A-0 165 885 discloses concentrated liquid hard-surface cleaning compositions containing a ternary active system having hydrotroping properties. US-3,591,510 relates to the use of propylene-glycol derivatives in dilute liquid hard-surface cleansers.

It is an object of the present invention to provide concentrated liquid hard-surface cleaner compositions which are compatible with surfaces to be cleaned therewith and packaging materials. It is a further object of the present invention to provide a concentrated liquid hard-surface cleaner composition with excellent cleaning on kitchen and bathroom soils and very good shine performance.

It is another object of the present invention to provide a concentrated liquid hard-surface cleaner containing an organic solvent and which does not require an excessive level of hydrotrope.

Summary of the Invention

The present invention relates to concentrated liquid cleaning compositions being substantially free of terpene solvents, containing from 6% to 20% by weight of a surface-active agent and from 5% to 20% by weight of a solvent of the formula:



wherein R is a C_1 to C_8 alkyl, alkenyl or alkyl aryl group, preferably a C_1 to C_4 alkyl group, and n is an integer from 1 to 4, preferably 1 or 2.

Detailed Description of the Invention

The surface-active agents, the solvent and the optional ingredients are described in more detail hereinafter.

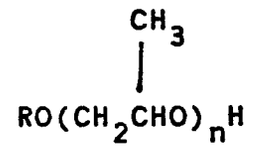
Unless indicated to the contrary, the %-indications stand for "% by weight".

Surface-active Agents

Water-soluble detersive surfactants useful herein include well-known synthetic anionic, nonionic amphoteric and zwitterionic surfactants and mixtures thereof. Typical of these are the alkyl benzene sulfates and sulfonates, paraffin sulfonates, olefin sulfonates, alkoxylated (especially ethoxylated) alcohols and alkyl phenols, amine oxides, sulfonates of fatty acids and of fatty acid esters, and the like, which are well-known in the detergency art. In general, such detersive surfactants contain an alkyl group in the C_{10}-C_{18} range; the anionic detersive surfactants are most commonly used in the form of their sodium, potassium or triethanolammonium salts. The nonionics generally contain from 3 to 17 ethylene oxide groups per mole of hydrophobic moeity. Especially preferred in the compositions of the present invention are:
C_{12}-C_{16} alkyl benzene sulfonates, C_{12}-C_{18} paraffin-sulfonates and the ethoxylated alcohols of the formula $RO(CH_2CH_2O)_nH$, with R being a C_{12}-C_{15} alkyl chain and n being a number from 3 to 10.

Anionic surfactants are frequently present at levels from 5 to 20% of the composition. Nonionic surfactants, are used at levels between 1% to 10% by weight of the composition. Mixtures of the like surfactants can also be used. The total level of surface-active agents in the present concentrated compositions is in excess of 6% by weight, generally from 6% to 20% by weight of the total composition.

The organic solvent -The organic solvent to be used in the present composition has the general formula



wherein R is an alkyl, alkenyl, or alkyl-aryl group having from 1 to 8 carbon atoms, and n is an integer from 1 to 4. Preferably, R is a alkyl group containing 1 to 4 carbon atoms, and n is 1 or 2. Especially preferred R groups are n-butyl or isobutyl. Most preferred species are 1-n-butoxypropane-2-ol (n = 1); and 1(2-n-butoxy-1-methylethoxy)propane-2-ol (n = 2), and mixtures thereof. 1-n-butoxypropane-2-ol is especially preferred.

The organic solvent herein is used at levels of from 5 to 20% by weight of the composition, preferably 7 to 15%.

The solvent system can contain, in combination with the solvent described hereinabove, water-soluble CARBITOL® solvents or water-soluble CELLOSOLVE® solvents. Water-soluble CARBITOL® solvents are compounds of the 2-(2-alkoxyethoxy)ethanol class wherein the alkoxy group is derived from ethyl, propyl or butyl; a preferred water-soluble carbitol is 2-(2-butoxyethoxy)ethanol also known as butyl carbitol. Water-soluble CELLOSOLVE® solvents are compounds of the 2-alkoxyethoxy ethanol class, with 2-butoxyethoxyethanol being preferred.

Suitable solvents to be used with the solvents of the invention are also benzyl alcohol, and diols such as 2-ethyl-1,3-hexanediol and 2,2,4-trimethyl-1,3-pentanediol.

Preferred solvents to be used in combination with the propylene glycol derivatives hereinabove, are Carbitol® solvents. An especially preferred mixture is represented by 1-n-butoxypropane-2-ol and butyl carbitol, in a weight ratio of 2:1 to 1:2; the level of co-solvent is preferably from 4% to 8% of the total composition.

The total level of organic solvent in the composition is typically from 10% to 25% by weight.

The compositions herein are substantially free of terpene-solvents. Inasmuch as solvents are generally used at levels exceeding about 2%, terpenes cannot be incorporated in the claimed compositions in such proportions. It is understood, however, that relatively minor sub-additive levels of terpenes, e.g., below 1% (calculated on the total cleanser composition), can be present originating from conventional ingredients such as perfumes.

Optional Ingredients -In addition to the essential ingredients listed hereinbefore, the present composition can contain additional components, which can be highly desirable.

For example, it is highly preferred that the compositions contain a detergent builder and/or metal ion sequestrant. Compounds classifiable and well-known in the art as detergent builders include the nitrilotriacetates, (NTA), polycarboxylates, citrates, water-soluble phosphates such as tri-polyphosphate and sodium ortho-and pyro-phosphates, silicates, ethylene diamine tetraacetate (EDTA), amino-poly-phosphonates (DEQUEST), phosphates and mixtures thereof. Preferred builders/sequestrants for use in the present invention are NTA, EDTA, citrates and mixtures thereof. The builders/sequestrant will be present at levels of from 5% to 15%, preferably from 7% to 12%.

It is highly preferred, as well, to include soaps in the compositions of the invention. Soaps prepared from coconut oil fatty acids are preferred.

Soaps can be used in amounts ranging from 0.2% to 3% by weight of the composition.

Optional components are also represented by ingredients typically used in commercial products to provide aesthetic or additional product performance benefits. Typical ingredients include pH regulants, perfumes, dyes, optical brighteners, soil suspending agents, detersive enzymes, gel-control agents, thickeners, freeze-thaw stabilizers, bactericides, preservatives, and the like.

Another optional but highly desirable ingredient for use herein is represented by conventional detergent hydrotropes. Examples of suitable hydrotropes are urea, monoethanolamine, diethanolamine, triethanolamine and the sodium potassium, ammonium and alkanol ammonium salts of xylene-, toluene-, ethylbenzene-and isopropyl-benzene sulfonates. It is a particular feature of the present invention, however, that concentrated formulations can be prepared without the need for an excessive amount of hydrotrope, thus preventing a negative effect on shine performance.

The compositions herein typically contain water as a carrier. By way of example the water-level can vary in the range from e.g. 40% to 60%. Water-alchol (e.g., ethanol, isopropanol, butanol, etc.) mixtures can also be used. Alkylated polysaccharides can be used to increase the stability and performance characteristics of the compositions.

The compositions herein are preferably formulated in the alkaline pH range, generally in the range of pH 8-11, preferably about 10-10.8. Caustics such as sodium hydroxide and sodium carbonate can be used to adjust and buffer the pH as desired.

The claimed concentrates can be used as such, or preferably diluted in water before use, typically 4 times.

The following examples are given by way of illustrating the compositions herein, but are not intended to be limiting of the scope of the invention.

Abbreviations

NaPS Sodium C_{13} to C_{16} paraffin sulfonate
LAS Sodium salt of linear C_{11}-C_8 alkyl benzene sulfonate
LAB Linear C_{10-22} alkyl benzene
Lutensol® A07 Condensate of 1 mole C_{12}-C_{14} fatty alcohol with 7 moles of ethylene oxide
Dobanol® 45/7 C_{14}-C_{15} oxoalcohol with 7 moles of ethylene oxide per mole of alcohol
HCnFA Narrow cut, hardened, coconut fatty acid
NTA Sodium nitrilotriacetate
EDTA Ethylene diamine tetraacetate
ETHD 2-Ethyl-1,3-hexanediol
TMPD 2,2,4-trimethyl-1-3-pentanediol
NaCS Sodium cumene sulfonate

Concentrated liquid cleansers were prepared by mixing the listed ingredients in the stated proportions (% by weight).

Ingredients	Ex. I	Ex. II
NaPS	6.0	6.0
Lutensol^{R}AO7	2.0	2.0
Na_2CO_3	2.0	2.0
HC_nFA	0.7	0.7
1-Butoxypropane-2-ol	5.5	7.0
1(2-Butoxy-1-methyl-ethoxy) propane-2-ol	7.0	-
Butyl carbitol	-	5.0
EDTA	3.0	3.0
Sodium citrate	7.0	7.0
NaCS	14.0	11.0
Perfume + minors + water	up to 100	

The following prior art composition (non-concentrated) was also prepared:

Composition A

NaPS	2.5
Lutensol^{R}A07	0.5
Na_2CO_3	3.0
HCnFA	0.1
Benzyl alcohol	1.5
Orange terpene	2.0
Sodium citrate	3.0
NaCS	1.5
Perfume, minors & water	up to 100.

The concentrates of Example I and Example II were diluted four times in water, and the resulting compositions were compared with Composition A, in terms of cleaning performance on kitchen soil and bathroom soil.

The test-soils were prepared as follows.

a) HBTS soil (bathroom soil): is composed of 250 ml isopropyl alcohol, 75g calcium stearate powder and 0.5g carbon black. It is applied on an enamel-coated metal plate (cleaned with a detergent and then with alcohol) with a paint roller, and the plates are baked at 180°C for 20 minutes.

b) KD soil (kitchen soil): is composed of 25% HSW® soil with carbon black (2), 37.5% Crisco® (1) oil, 37.5% Puritan® (1) oil. This soil is rolled onto stainless steel plates (beforehand cleaned with a detergent and then with alcohol) using a paint roller. A very thin uniform layer is needed since the soil is difficult to cure.

The plates are placed in the oven at 115°C ("soft soil") or 170°C ("hard soil") for 2 hours and then allowed to age at least 1 day.

(1) commercial cooking oil sold by The Procter & Gamble Company

(2) commercial soil sold by Chem Pack Inc., U.S.A.

The testing conditions were as follows:

The test was run with the aid of an Erichsen washability machine. A sponge of approximately 9.5 x 5 x 4 cm was used after being carefully washed under hot running water and squeezed through drying rolls. 5g of the undiluted cleaner to be tested was spread over one side of the sponge. The number of strokes of the cleaning machine varied with the type of soil. Performance readings were done as soon as visible cleaning

diffrences became noticeable. The gradings were done visually by three judges working independently. The performance benefits were established via paired comparison with duplicates as follows. A 0-4 scale was used whereby: 0 means no difference; 1 = probable difference; 2 = consistent difference; 3 = clear difference; 4 = big difference.

The testing results were as listed below. Prior art composition A was the reference against which the composition of examples I and II were compared.

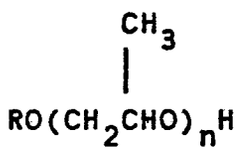
Soil	Comp. A	Ex. I	Ex. II
KD	Ref.	+ 2.0	+ 2.0
HBTS	Ref.	+ 2.0	+ 2.0

The above test clearly confirms the significant cleaning performance benefits derivable from the inventive compositions vs. related art composition.

The compositions of Examples I and II were also found to give an excellent shine performance on cleaned surfaces.

Claims

1. A concentrated liquid hard-surface cleaning composition, being substantially free of terpene solvent, containing from 6% to 20% by weight of a surface-active agent and from 5% to 20% by weight of a solvent having the formula:



wherein R is a C_1 to C_8 alkyl, alkenyl or alkyl aryl group, preferably a C_1 to C_4 alkyl group, and n is an integer from 1 to 4.

2. A composition in accordance with Claim 1 wherein R is a C_1 to C_4 alkyl group, and n is 1 or 2.

3. A composition in accordance with Claims 1 and 2 wherein the organic solvent is 1-n-butoxypropane-2-ol or is 1(2-n-butoxy-1-methyl ethoxy)propane-2-ol, or is a mixture thereof.

4. A composition in accordance with Claim 1 which in addition contains a co-solvent selected from benzyl alcohol, butyl carbitol, 2-ethyl-1,3-hexanediol, and 2,2,4-trimethyl-1,3-pentanediol; in a weight ratio of solvent to co-solvent of from 2:1 to 1:2.

5. A composition in accordance with Claim 4 wherein the solvent is 1-n-butoxypropane-2-ol and the co-solvent is butyl carbitol, in a weight ratio of 2:1 to 1:2.

6. A composition in accordance with Claims 1-4 which contains from 5% to 15% by weight of a detergent builder and/or metal ion sequestrant.

7. A composition in accordance with Claim 5 wherein said detergent builder and/or metal ion sequestrant material is selected from nitrilotriacetate, ethylene diamine tetraacetate, citrate, and mixtures thereof.

8. A concentrated hard-surface cleaning composition containing
-from 6% to 10% of a surface-active agent;
-from 7% to 15% of a solvent selected from 1-n-butoxy-propane-2-ol, 1(2-n-butoxy-1-methylethoxy)propane-2-ol, and mixtures thereof;
-from 4% to 8% of a co-solvent selected from butyl carbitol, 2-ethyl-1,3-hexanediol, and 2,2,4-trimethyl-1,3-pentanediol;
-from 7% to 12% of a detergent builder and/or metal ion sequestrant material selected from nitrilotriacetate, ethylenediamine tetraacetate, citrate, and mixtures thereof.