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(54) **Hard surface cleaning compositions.**

(57) Liquid hard surface cleaning composition as described which comprises anionic surfactant ammonium salts, a solvent system and piperazine.

The compositions according to the invention are particularly suitable for use as light duty cleaners.

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HARD-SURFACE CLEANING COMPOSITIONS

Technical field

The invention relates to a hard surface cleaning composition which can be formulated as a light duty cleaner, hence providing at the same time cleaning benefits and shine; as an alternative, the compositions
 5 of the invention can be formulated as an all-purpose, heavy duty cleaner having superior cleaning properties.

Background

10 Hard surface cleaning compositions are well known in the art and their cleaning performances have been well improved over the years. While focusing on cleaning performances, essentially grease-cutting performance, a new problem has been encountered in that good shine results were not obtained with these compositions, unless the surface which had been cleaned had also been rinsed afterwards, i.e., that good shine performance was incompatible with good cleaning performance, in a non rinse-type hard surface
 15 cleaner. Indeed, when used, most compositions leave streaking traces and/or a residual film on the cleaned surfaces which, as a consequence, do not have a good appearance.

Such problem is particularly a nuisance when the hard surface cleaner is used to clean windows or mirrors, because the residual film is even more apparent.

US 3,591,510 discloses hard surface cleaners which contain surfactants possibly in the form of their
 20 ammonium salt, a solvent mixture, and a water soluble builder.

US3,591,509 discloses compositions containing surfactants possibly present in the form of their ammonium salt, a solvent mixture, a water soluble builder and a water soluble carboxyethylcellulose.

GB 2 160 887 discloses a composition containing an anionic surfactant, water soluble and water insoluble alcohols and an organic solvent.

25 J 62034998 discloses compositions containing an anionic surfactant salt, a water soluble solvent, sodium or potassium hydroxide, and monoethanolamine.

J 58101198 discloses compositions containing alkanolamine, a mixture of anionic and nonionic surfactant and polypropylene glycol.

UK application 89-09157.3 which is unpublished at the date of filing of this application discloses
 30 compositions containing anionic surfactant ammonium salts, mono- and/or di- and/or tri- ethanolamine, or mixtures thereof and a solvent system.

UK application 89-870186.7 which is unpublished at the date of filing of this application discloses compositions containing anionic surfactant ammonium salts, a specific solvent system and a specific monoalcohol; the compositions disclosed therein show superior performance, but also have an unpleasant
 35 odor because of the monoalcohol; this compositions, as all the other previously listed ones are free of piperazine.

The present invention is based on the discovery that piperazine, when used in the cleaning compositions disclosed hereinafter, provides outstanding cleaning performances without impairing the shine performance of said cleaning compositions.

40 It is hence an object of the present invention to provide liquid, hard surface cleaning compositions which have superior cleaning performance as well as good shine performance, i.e. which are suitable for a non-rinse use.

It is another object of the present invention to provide liquid, hard surface cleaning compositions which can be used on all surfaces, and which are especially efficient on glass.

45 It is an alternative object of the invention to provide a hard surface cleaner which can also be formulated as an all-purpose, heavy-duty cleaning composition.

Other objects and advantages of the present invention will appear from the following description.

Summary of the invention

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The invention provides hard surface cleaning compositions which comprise:

- from 0.04 to 0.6% by weight of the total composition of anionic surfactants ammonium salts,
- from 1.5 to 15% by weight of the total composition of a solvent system,
- from 0.25% to 3% by weight of the total composition of piperazine.

Detailed description of the invention

The compositions according to the invention comprise from 0.04% to 0.6% by weight of the total composition, preferably from 0.07% to 0.45% by weight of the total composition of a surfactant, or mixtures thereof; well-known synthetic anionic, nonionic, amphoteric and zwitterionic surfactants are suitable for use herein. Typical of these are the alkyl benzene sulfates and sulfonates, paraffin sulfonates, olefin sulfonates, alkoxyated (especially ethoxyated) 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 deterative surfactants contain an alkyl group in the C₁₀-C₁₈ range; the anionic deterative 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 moiety. Especially preferred for use in the compositions of the invention are the anionic surfactants, in the form of their ammonium salts.

The compositions of the invention also feature a solvent system, which consists of from 1.5% to 15% by weight of the total composition of an organic solvent, or mixtures thereof, which have a boiling point between 60° c and 190° c.

Highly preferred for use herein is a solvent system, consisting of:

- From 1% to 9% by weight of the total composition of ethanol, preferably 9%;
- From 0 to 3% by weight of the total composition of n-propoxypropanol, preferably 2%;
- From 0.5% to 3% by weight of the total composition of n-butoxypropanol, preferably 2%.

An essential ingredient of the compositions according to the present invention is piperazine (also referred to as diethylenediamine), in amounts of from 0.25% to 3% by weight of the total composition; Piperazine is a well-known, commercially available compound, and both piperazine and its hydrated form (piperazine hexahydrate) are suitable for use herein.

In an embodiment of the invention, the compositions are advantageously supplemented with organic amines; said amines are volatile, i.e. they have a boiling point below about 150° c, are water-soluble and provide alkalinity, i.e. they have a pK_b < 5.5; preferably, these amines will be also odorless. Preferred compounds according to the foregoing are monoethanolamine, diethanolamine, triethanolamine, or mixtures thereof. Highly preferred is monoethanolamine.

The compositions according to the invention may also contain builders. Suitable builders for use herein include nitrilotriacetates, polycarboxylates, nitrates, water soluble phosphates, silicates, ethylene diamine tetraacetate (EDTA), amino polyphosphonates, phosphates and mixtures thereof. Other builders, which are highly preferred are the iminodiacetic builders; most preferred is 2-hydroxy iminodiacetic acid.

The composition of the invention may contain optionals at conventional levels; such optionals include perfumes, dyes, optical brighteners, thickeners, soil suspending agents, enzymes, freeze thaw, bactericides and preservatives.

In a preferred embodiment of the invention, the compositions are formulated as light duty cleaners, i.e. cleaners which are suitable for a non-rinse use.

Typically, the amount of piperazine in these light duty compositions is no more than 1% by weight of the compositions, preferably about 0.5% by weight of the total composition, and the solvent system is present in amounts of about 13% by weight of the total composition; these compositions may be free of builders, or may contain very low amounts of builders, since these are detrimental to the shine performance of cleaning compositions; typically, these compositions contain less than 0.25% by weight of the composition of builders.

In another embodiment of the invention, the compositions can be formulated as all-purpose cleaners, in which the cleaning performance is privileged over the shine properties.

In such cases, the amount of piperazine in the compositions can be as high as 3% by weight of the compositions; since a perfect shine is not a desired property of these compositions, the amount of builders can also be raised to about 3% by weight of the total composition.

The following examples will illustrate the present invention, and are not meant to restrict its scope.

Example 1

The following light duty composition is prepared by mixing all ingredients (percentages are by weight of total composition)

-0.15%.....Linear alkyl benzene sulfonate ammonium salt

-2.0%.....n-butoxypropanol

5 -2.0%.....n-propoxypropanol

-9%.....ethanol

-up to 100% water and miscellaneous

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This reference composition was then supplemented with 0.25%, 0.5% or 1% of piperazine, on top of said composition. These three compositions according to the invention were then compared the above reference composition (i.e. without any piperazine) both for their shine performance as well as for their cleaning performance.

15 The cleaning performance was evaluated on synthetic soils which were made as described in the following :

KD soil are made of 25% HSW^R soil with carbon black (2), 37.5% Crisco^R (1) oil, 37.5% Puritan^R (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.

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

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

The test conditions were as follows :

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All tests were 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 cleanser to be tested on spread over one side of the sponge. The number of strokes of the cleaning machine needed to clean the plates were counted.

30 The shine performance was evaluated on mirrors, using the compositions as a spray cleaner. The composition which is sprayed on the mirror is then wiped, using commercially available Domex^R paper towel.

The degree of filming/streaking is visually evaluated by 3 judges working independently using a 0-4 scale, whereby 0 = no difference and 4 = great difference.

The results are as follows:

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Compositions

	Ref	+ 0.25%	+ 0.5%	+ 1.0%
		piperazine	piperazine	piperazine
40				
Soft KD	30	14	3	2
45 # strokes				
Hard KD	>63	>70	15	3
50 # strokes				
Shine	ref	- 0.2	- 0.2	- 0.7
55 Psu gr.				

The above results show that the composition of the invention exhibit outstanding cleaning performance,

while retaining as good shine results as the reference compositions.

Examples I-IV

5 The following light duty compositions are made by mixing the listed ingredients in the listed proportions.

The abbreviations are:

NH₄LAS stands for ammonium salt of linear alkyl benzene sulfonate;

nBp stands for n-butoxypropanol;

10 nPp stands for n-propoxypropanol;

The builder used is 2-hydroxypropyl iminodiacetic acid;

The balance is made with water and minors.

	I	II	III	IV
NH ₄ LAS.....	0.15.....	0.15.....	0.15.....	0.2
nBp.....	2.....	1.....	1.5.....	1.5
20 nPp.....	2.....	1.....	1.5.....	1.5
Ethanol.....	9.....	5.....	7.....	7.5
Piperazine.....	0.5.....	0.5.....	0.4.....	0.35
25 Builder.....	0.25.....	-.....	-.....	-..
Balance.....	-up to 100%-	-.....	-.....	-.....

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Example V

The following heavy duty composition is made by mixing the listed ingredients in the listed proportions.

The abbreviations used are the same as in the previous examples.

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NH ₄ LAS.....	0.15
nBp.....	2
40 nPp.....	2
Ethanol.....	9
Piperazine.....	3
45 Builder.....	2
Balance.....	up to 100%

50 Claims

1. A hard surface cleaning composition comprising
 - from 0.04% to 0.6% by weight of the total composition of a surfactant system;
 - from 1.5% to 15% by weight of the total composition of a solvent system;
 - 55 - from 0.25% to 3% by weight of the total composition of piperazine.
2. A hard surface cleaning composition wherein the surfactant are ammonium salts of anionic surfactants.

3. A hard surface cleaning composition according to claim 1 or 2, which comprises 0.5% by weight of the total composition of piperazine.
- 5 4. A hard surface cleaning composition according to any of the preceeding claims, wherein the solvent system consists of
- from 1% to 9% by weight of the total composition of ethanol;
 - from 0% to 3% by weight of the total composition of n-propoxypropanol;
 - from 0.5% to 3% by weight of the total composition of n-butoxypropanol.
- 10 5. A hard surface cleaning composition according to claim 4 wherein the solvent system consists of
- 9% by weight of the total composition of ethanol;
 - 2% by weight of the total composition of n-butoxypropanol;
 - 2% by weight of the total composition of n-propoxypropanol
- 15 6. A hard surface cleaning composition according to any of the preceding claims which additionally contains up to 3% of a builder.
7. A hard surface cleaning composition according to claim 6 wherein the builder is 2-hydroxy propyl imino diacetic acid.
- 20 8. A hard surface cleaning composition according to claim 6 or 7 which contains 3% by weight of the total composition of piperazine.
- 25 9. A hard surface cleaning composition according to claims 6,7 or 8 which contains 15% by weight of a solvent system

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EUROPEAN SEARCH REPORT

Application Number

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
	No relevant documents have been disclosed. -----		C 11 D 3/43 C 11 D 3/28
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			C 11 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11-09-1990	Examiner GOLLER P.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			