(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 340 001 A2**

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **89304211.9**

(51) Int. Cl.^{4}: **C 11 D 3/39**

(22) Date of filing: **27.04.89**

(30) Priority: **29.04.88 GB 8810268**
16.05.88 GB 8811546

(43) Date of publication of application:
02.11.89 Bulletin 89/44

(84) Designated Contracting States:
CH DE ES FR GB IT LI NL SE

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(84) Designated Contracting States:
CH DE ES FR IT LI NL SE

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(54) **Liquid cleaning products.**

(57) The self-heating of bleach-containing non-aqueous liquid cleaning products comprising solid particles dispersed in a liquid phase can be inhibited by incorporation of a free radical scavenger.

Bundesdruckerei Berlin

Description

LIQUID CLEANING PRODUCTS

The present invention comprises substantially non-aqueous liquid cleaning products of the kind comprising solid particles dispersed in a liquid phase.

For reasons precisely unknown, when such products are manufactured in large quantities and then stored, in the hours immediately after preparation, the temperature in the bulk of the liquid can rise considerably. We have termed this effect "self-heating". As well as being a safety hazard, there is also the possibility that some components in the product can thereby decompose.

The applicants have now found that this problem can be mitigated if a free radical scavenger is included in the product.

Thus, according to the invention there is provided a substantially non-aqueous liquid cleaning composition comprising a dispersion of solid particles in a liquid phase, said composition containing bleach and a free-radical scavenger agent.

The problem is particularly acute when a bleach especially an inorganic persalt, optionally in the presence of a precursor therefor, is included in the product. Thus, such bleach containing products are a preferred form of the present invention since in these, the action of the scavenger is particularly beneficial. The persalt may be sodium perborate, especially in the monohydrate form. Other persalts are mentioned hereinbelow.

Free radical scavengers are well known in the art of organic chemistry and thus the particular agent used may be chosen from a very wide range of known compounds. However, two typical examples are butylhydroxytoluene (BHT) and 1,1,3-tris(2-methyl-4-hydroxy-5-t-butylphenyl) butane, sold under the tradename Topanol CA (ex ICI). Mixtures of different scavengers may also be employed.

Usually, the scavenger may be incorporated at from 0.1% to 1% by weight of the total composition, typically from 0.25% to 0.5%.

We are aware of European patent specification EP-A-209228 (Chlorox) which describes the use of a free radical scavenging agent to stabilize aqueous bleach compositions, thereby to prevent the nonionic surfactant or any other ingredients from being attacked by the bleach.

We are also aware of United States patent specification US 4088594 (Fernley/Shell) which discloses the stabilization of nonionic surfactants with alkylidene bisphenols even in the absence of water.

Neither of the above mentioned specifications however discloses that the self-heating of bleach containing non-aqueous liquids can be reduced by the use or a scavenging agent.

The bleach may comprise a halogen, particularly a chlorine bleach such as is provided in the form of the known alkalimetal hypohalites, e.g. hypochlorites. In the application of fabrics washing, the oxygen bleaches are preferred, for example in the form of an inorganic persalt, preferably with an precursor, or as a peroxy acid compound.

The inorganic persalt bleaches are most preferred. It is also then preferred to include a precursor which makes the bleaching more effective at lower temperatures, i.e. in the range from ambient temperature to about 60°C, so that such bleach systems are commonly known as low-temperature bleach systems and are well known in the art. The inorganic persalt such as sodium perborate, both the monohydrate and the tetrahydrate, acts to release active oxygen in solution, and the precursor is usually an organic compound having one or more reactive acyl residues, which cause the formation of peracids, the latter providing for a more effective bleaching action at lower temperatures than the peroxybleach compound alone. The ratio by weight or the peroxy bleach compound to the precursor is from about 15:1 to about 2:1, preferably from about 10:1 to about 3.5:1. Whilst the amount of the bleach system, i.e. peroxy bleach compound and precursor, may be varied between about 5% and about 35% by weight of the total liquid, it is preferred to use from about 6% to about 30% of the ingredients forming the bleach system. Thus, the preferred level of the peroxy bleach compound in the composition is between about 5.5% and about 27% by weight, while the preferred level of the precursor is between about 0.5% and about 10%, most preferably between about 1% and about 5% by weight.

Typical examples of the suitable peroxybleach compounds are alkalimetal peroborates, both tetrahydrates and monohydrates, alkali metal percarbonates, persilicates and perphosphates, of which sodium perborate is preferred.

Precursors for peroxybleach compounds have been amply described in the literature, including in British patent specifications 836,988, 855,735, 907,356, 907,358, 907,950, 1,003,310, and 1,246,339, US patent specifications 3,332,882, and 4,128,494, Canadian patent specification 844,481 and South African patent specification 68/6,344.

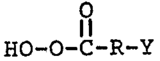
The exact mode of action of such precursors is not known, but it is believed that peracids are formed by reaction of the precursors with the inorganic peroxy compound, which peracids then liberate active-oxygen by decomposition.

They are generally compounds which contain N-acyl or O-acyl or O-aryl residues in the molecule and which exert their activating action on the peroxy compounds on contact with these in the washing liquor.

Typical examples of precursors within these groups are polyacylated alkylene diamines, such as N,N,N^1,N^1-tetraacetylethylene diamine (TAED) and N,N,N^1,N^1-tetraacetylmethylene diamine (TAMD); acylated glycolurils, such as tetraacetylgylcoluril (TAGU); triacetylcyanurate and sodium sulphophenyl ethyl carbonic acid ester.

A particularly preferred precursor is N,N,N^1,N^1-tetra- acetylethylene diamine (TAED).

The organic peroxyacid compound bleaches are preferably those which are solid at room temperature and most preferably should have a melting point of at least 50°C. Most commonly, they are the organic peroxyacids and water-soluble salts thereof having the general formula



$$HO-O-\overset{\overset{O}{\|}}{C}-R-Y$$

wherein R is an alkylene or substituted alkylene group containing 1 to 20 carbon atoms or an arylene group containing from 6 to 8 carbon atoms, and Y is hydrogen, halogen, alkyl, aryl or any group which provides an anionic moiety in aqueous solution.

Another preferred class of peroxygen compounds which can be incorporated to enhance dispensing/dispersibility in water are the anhydrous perborates described for that purpose in European patent specification EP-A-217,454 (Unilever).

In the compositions of the present invention, the liquid phase can be a liquid surfactant, an organic non-aqueous non-surfactant liquid, or a mixture of such materials. Many of the compositions do contain a surfactant as a dispersed or dissolved solid, or more often, as all or part of said liquid phase. These surfactant compositions are liquid detergent products, e.g. for fabrics washing or hard surface cleaning. However, the wider term 'liquid cleaning product' also includes non-surfactant liquids which are still useful in cleaning, for example non-aqueous bleach products or those in which the liquid phase consists of one or more light, non-surfactant solvents for greasy stain pre-treatment of fabrics prior to washing. Such pre-treatment products can contain solid bleaches, dispersed enzymes and the like.

The solid particles can be maintained in dispersion in the liquid phase (i.e. resist settling, even if not perfectly) by a number of means. For example, settling may be inhibited purely by virtue of the relative small size of the particles and the relatively high viscosity of the solvent phase. In other words, the particles settle very slowly at a rate predicted by Stokes' law or due to the formation of a loosely aggregated network of particle flocs. This effect is utilised in the compositions described in patent specifications EP-A-30 096 (ICI) and GB 2 158 838A (Colgate-Palmolive). However, there have also been several prior proposals to utilise additional means to enhance solid-suspending properties in such non-aqueous liquids. These are somewhat analogous to so-called external structuring techniques used in aqueous systems; i.e., in addition to the particulate solids and the liquid phase in which they are to be suspended, an additional dispersant is used which by one means or another, acts to aid stable dispersion or suspension of the solids for a finite period. Any of these means may be employed in the compositions according to the present invention.

One such suitable stabilisation involves use of nonionic surfactant as the liquid phase and to add an inorganic carrier material as the dispersant, in particular highly voluminous silica. This acts by forming a solid-suspending network. This silica is highly voluminous by virtue of having an extremely small particle size, hence high surface area. This is described in GB patent specifications 1,205,711 (Unilever) and 1,270,040 (Unilever).

A similar suitable structuring can be effected using fine particulate chain structure-type clay, as described in specification EP-A-34,387.

Another appropriate known use of a substance as a dispersant for particles in nonionic-based non-aqueous compositions entails incorporating a hydrolyzable co-polymer of maleic anhydride with ethylene or vinylmethylether, which co-polymer is at least 30% hydrolyzed. This is described in specification EP-A-28,849.

Another appropriate means by which such dispersions have been stablised is the use of a dispersant material which has been termed 'a deflocculant' , according to the disclosure of European Patent Specification EP-A-266 199 (Unilever).

All compositions according to the present invention are liquid cleaning products. They may be formulated in a very wide range of specific forms, according to the intended use. They may be formulated as cleaners for hard surfaces (with or without abrasive) or as agents for warewashing (cleaning of dishes, cutlery etc) either by hand or mechanical means, as well as in the form of specialised cleaning products, such as for surgical apparatus or artificial dentures. They may also be formulated as agents for washing and/or conditioning of fabrics.

In the case of hard-surface cleaning, the compositions may be formulated as main cleaning agents, or pre-treatment products to be sprayed or wiped on prior to removal e.g. by wiping off or as part of a main cleaning operation.

On the case of warewashing, the compositions may also be the main cleaning agent or a pre-treatment product, e.g applied by spray or used for soaking utensils in an aqueous solution and/or suspension thereof.

Those products which are formulated for the cleaning and/or conditioning of fabrics constitute an especially preferred form of the present invention. These compositions may for example, be of the kind used for pre-treatment of fabrics (e.g. for spot stain removal) with the composition neat or diluted, before they are rinsed and/or subjected to a main wash. The compositions may also be formulated as main wash products, being dissolved and/or dispersed in the water with which the fabrics are contacted. In that case, the composition may be the sole cleaning agent or an adjunct to another wash product. Within the context of the present invention, the term 'cleaning product' also embraces compositions of the kind used as fabric conditioners (including fabric softeners) which are only added in the rinse water (sometimes referred to as 'rinse conditioners').

Thus, the compositions will contain at least one agent which promotes the cleaning and/or conditioning of the article(s) in question, selected according to the intended application. Usually, this agent will be selected from surfactants, enzymes, bleaches, microbiocides, (for fabrics) fabric softening agents and (in the case of hard surface cleaning) abrasives. Of course in many cases, more than one of these agents will be present, as well as other ingredients commonly used in the relevant product form.

The compositions will be substantially free from agents which are detrimental to the article(s) to be treated. For example, they will be substantially free from pigments or dyes, although of course they may contain small amounts of those dyes (colourants) of the kind often used to impart a pleasing colour to liquid cleaning products, as well as fluorescers, bluing agents and the like.

All ingredients before incorporation will either be liquid, in which case, in the composition they will constitute all or part of the liquid phase, or they will be solids, in which case, in the composition they will either be dispersed as deflocculated particles in the liquid phase or they will be dissolved in the liquid phase. Thus as used herein, the term "solids" is to be construed as referring to materials in the solid phase which are added to the composition and are dispersed therein in solid form, those solids which dissolve in the liquid phase and those in the liquid phase which solidify (undergo a phase change) in the composition, wherein they are then dispersed.

If a deflocculant is incorporated, some liquids are alone, unlikely to be suitable to perform the function of liquid phase for any combination of solids and dispersant/deflocculant. However, they will be able to be incorporated if used with another liquid which does have the required properties, the only requirement being that where the liquid phase comprises two or more liquid ingredients, they are miscible when in the total composition or one can be dispersible in the other, in the form of fine droplets.

Where surfactants are solids, they will usually be dissolved or dispersed in the liquid phase. Where they are liquids, they will usually constitute all or part of the solvent. Also, some surfactants are eminently suitable as deflocculants.

In general, however, surfactants may be chosen from any of the classes, sub-classes and specific materials described in 'Surface Active Agents' Vol. I, by Schwartz & Perry, Interscience 1949 and 'Surface Active Agents' Vol. II by Schwartz, Perry & Berch (Interscience 1958), in the current edition of "McCutcheon's Emulsifiers & Detergents" published by the McCutcheon division of Manufacturing Confectioners Company or in 'Tensid-Taschenbuch' H. Stache, 2nd Edn., Carl Hanser Verlag, München & Wien, 1981.

Liquid surfactants are an especially preferred class of material to use in the liquid phase, especially polyalkoxylated types and in particular polyalkoxylated nonionic surfactants.

As a general rule, the applicants have found that the most suitable liquids to choose for the liquid phase are those organic materials having polar molecules. In particular, those comprising a relatively lipophilic part and a relatively hydrophilic part, especially a hydrophilic part rich in electron lone pairs, tend to be well suited. This is completely in accordance with the observation that liquid surfactants, especially polyalkoxylated nonionics, are one preferred class of liquid.

Nonionic detergent surfactants are well-known in the art. They normally consist of a water-solubilizing polyalkoxylene or a mono- or di-alkanolamide group in chemical combination with an organic hydrophobic group derived, for example, from alkylphenols in which the alkyl group contains from about 6 to about 12 carbon atoms, dialkylphenols in which each alkyl group contains from 6 to 12 carbon atoms, primary, secondary or tertiary aliphatic alcohols (or alkyl-capped derivatives thereof), preferably having from 8 to 20 carbon atoms, monocarboxylic acids having from 10 to about 24 carbon atoms in the alkyl group and polyoxypropylenes. Also common are fatty acid mono- and dialkanolamides in which the alkyl group of the fatty acid radical contains from 10 to about 20 carbon atoms and the alkyloyl group having from 1 to 3 carbon atoms. In any of the mono- and dialkanolamide derivatives, optionally, there may be a polyoxyalkylene moiety joining the latter groups and the hydrophobic part of the molecule. In all polyalkoxylene containing surfactants, the polyalkoxylene moiety preferably consists of from 2 to 20 groups of ethylene oxide or of ethylene oxide and propylene oxide groups. Amongst the latter class, particularly preferred are those described in European specification EP-A-225,654 (Unilever), especially for use as all or part of the solvent. Also preferred are those ethoxylated nonionics which are the condensation products of fatty alcohols with from 9 to 15 carbon atoms condensed with from 3 to 11 moles of ethylene oxide. Examples of these are the condensation products of C_{11-13} alcohols with (say) 3 or 7 moles of ethylene oxide. These may be used as the sole nonionic surfactants or in combination with those described in the last-mentioned European specification, especially as all or part of the solvent.

Another class of suitable nonionics comprise the alkyl polysaccharides (polyglycosides/oligosaccharides) such as described in any of specifications US 3,640,998; US 3,346,558; US 4,223,129; EP-A-92,355; EP-A-99,183; EP-A-70,074, '75, '76, '77; EP-A-75,994, '95, '96.

Nonionic detergent surfactants normally have molecular weights of from about 300 to about 11,000. Mixtures of different nonionic detergent surfactants may also be used, provided the mixture is liquid at room temperature. Mixtures of nonionic detergent surfactants with other detergent surfactants such as anionic, cationic or ampholytic detergent surfactants and soaps may also be used. If such mixtures are used, the mixture must be liquid at room temperature.

Examples of suitable anionic detergent surfactants are alkali metal, ammonium or alkylolamine salts of alkylbenzene sulphonates having from 10 to 18 carbon atoms in the alkyl group, alkyl and alkylether sulphates having from 10 to 24 carbon atoms in the alkyl group, the alkylether sulphates having from 1 to 5 ethylene oxide groups, olefin sulphonates prepared by sulphonation of C_{10-24} alpha-olefins and subsequent neutralization and hydrolysis of the sulphonation reaction product.

Other surfactants which may be used include alkali metal soaps of a fatty acid, preferably one containing 12 to 18 carbon atoms. Typical such acids are oleic acid, ricinoleic acid and fatty acids derived from castor oil, rapeseed oil, groundnut oil, coconut oil, palmkernal oil or mixtures thereof. The sodium or potassium soaps of these acids can be used. As well as fulfilling the role of surfactants, soaps can act as detergency builders or fabric conditioners, other examples of which will be described in more detail hereinbelow. It can also be remarked that the oils mentioned in this paragraph may themselves constitute all or part of the liquid phase, whilst the corresponding low molecular weight fatty acids (triglycerides) can be dispersed as solids or function as structurants.

Yet again, it is also possible to utilise cationic, zwitterionic and amphoteric surfactants such as referred to in the general surfactant texts referred to hereinbefore. Examples of cationic detergent surfactants are aliphatic or aromatic alkyl-di(alkyl) ammonium halides and examples of soaps are the alkali metal salts of C_{12}-C_{24} fatty acids. Ampholytic detergent surfactants are e.g. the sulphobetaines. Combinations of surfactants from within the same, or from different classes may be employed to advantage for optimising structuring and/or cleaning performance.

Non-surfactants which are suitable as solvents include those having the preferred molecular forms referred to above although other kinds may be used, especially if combined with those of the former, more preferred types. In general, the non-surfactant solvents can be used alone or with in combination with liquid surfactants. Non-surfactant solvents which have molecular structures which fall into the former, more preferred category include ethers, polyethers, alkylamines and fatty amines, (especially di- and tri-alkyl- and/or fatty- $\underline{N}$-substituted amines), alkyl (or fatty) amides and mono- and di-$\underline{N}$-alkyl substituted derivatives thereof, alkyl (or fatty) carboxylic acid lower alkyl esters, ketones, aldehydes, and glycerides. Specific examples include respectively, di-alkyl ethers, polyethylene glycols, alkyl ketones (such as acetone) and glyceryl trialkylcarboxylates (such as glyceryl tri-acetate), glycerol, propylene glycol, and sorbitol.

Preferably, the compositions of the invention contain the liquid phase (whether or not comprising liquid surfactant) in an amount of at least 10% by weight of the total composition. The amount of the liquid phase present in the composition may be as high as about 90%, but in most cases the practical amount will lie between 20 and 70% and preferably between 20 and 50% by weight of the composition.

Preferably also, the compositions of the present invention contain a deflocculant which may be any of those referred to in the published prior art, most preferably any described in EP-A-266 199.

The level of any deflocculant material in the composition in very many cases is at least 0.01%, usually 0.1% and preferably at least 1% by weight, and may be as high as 15% by weight. For most practical purposes, the amount ranges from 2-12%, preferably from 4-10% by weight, based on the final composition.

The compositions according to the present invention preferably also contain one or more other functional ingredients, for example selected from detergency builders and (for hard surface cleaners) abrasives.

Detergency builders are those materials which counteract the effects of calcium, or other ion, water hardness, either by precipitation or by an ion sequestering effect. They comprise both inorganic and organic builders. They may also be sub-divided into the phosphorus-containing and non-phosphorus types.

Suitable inorganic builders comprise the various phosphate-, carbonate-, silicate-, borate- and aliminosilicate-type materals, particularly the alkali-metal salt forms. Mixtures of these may also be used.

Examples of phosphorus-containing inorganic builders include the water-soluble salts, especially alkali metal pyrophosphates, orthophosphates, polyphosphates and phosphonates. Specific examples of inorganic phosphate builders include sodium and potassium phosphates and hexametaphosphates, as well as potassium tripolyphosphate.

Examples of non-phosphorus-containing inorganic builders include water-soluble alkali metal carbonates, bicarbonates, borates, silicates, metasilicates, and crystalline and amorphous alumino silicates. Specific examples include sodium carbonate (with or without calcite seeds), potassium carbonate, sodium and potassium bicarbonates, silicates and zeolites.

Examples of organic builders include the alkali metal, ammonium and substituted, citrates, succinates, malonates, fatty acid sulphonates, carboxymethoxy succinates, ammonium polyacetates, carboxylates, polycarboxylates, aminopolycarboxylates, polyacetal carboxylates and polyhydroxysulphonates. Specific examples include sodium, potassium, lithium, ammonium and substituted ammonium salts of ethylenediaminetetraacetic acid, nitrilotriacetic acid, oxydisuccinic acid, melitic acid, benzene polycarboxylic acids and citric acid. Other examples are organic phosphonate type sequestering agents such as those sold by Monsanto under the tradename of the Dequest range and alkanehydroxy phosphonates.

Other suitable organic builders include the higher molecular weight polymers and co-polymers known to have builder properties, for example appropriate polyacrylic acid, polymaleic acid and polyacrylic/polymaleic acid co-polymers and their salts, such as those sold by BASF under the Sokalan Trade Mark.

The aluminosilicates are an especially preferred class of non-phosphorus inorganic builders. These for example are crystalline or amorphous materials having the general formula:

$Na_Z (AlO_2)_Z (SiO_2)_Y \times H_2O$

wherein Z and Y are integers of at least 6, the molar ratio of Z to Y is in the range from 1.0 to 0.5, and x is an integer from 6 to 189 such that the moisture content is from above 6% to about 20% by weight (termed herein, 'partially hydrated'). This water content provides the best rheological properties in the liquid. Above this level (e.g. from about 19% to about 28% by weight water content), the water level can lead to network formation. However, for increased inhibition of self-heating, it is most preferred for the aluminosilicate to be substantially anhydrous (e.g. having from 0 to about 6% by weight water content, typically around 4%). The anhydrous materials (i.e. with 0 to about 6% by weight of water) can also in some circumstances, be used as structurants. The preferred range of aluminosilicate is from about 12% to about 30% on an anhydrous basis. The aluminosilicate preferably has a particle size of from 0.1 to 100 microns, ideally betweeen 0.1 and 10 microns and a calcium ion exchange capacity of at least 200 mg calcium carbonate/g.

When the composition contains abrasives for hard surface cleaning (i.e. is a liquid abrasive cleaner), these will inevitably be incorporated as particulate solids. They may be those of the kind which are water insoluble, for example calcite. Suitable materials of this kind are disclosed in patent specifications EP-A-50,887; EP-A-80,221; EP-A-140,452; EP-A-214,540 and EP 9,942 (all Unilever), which relate to such abrasives when suspended in aqueous media. Water soluble abrasives may also be used.

The compositions of the invention optionally may also contain one or more minor ingredients such as fabric conditioning agents, enzymes, perfumes (including deoperfumes), micro-biocides, colouring agents, fluorescers, soil-suspending agents (anti-redeposition agents), corrosion inhibitors, enzyme stabilizing agents, and lather depressants.

In general, the solids content of the product may be within a very wide range, for example from 1-90%, usually from 10-80% and preferably from 15-70%, especially 15-50% by weight of the final composition. The solid phase should be in particulate form and have an average particle size of less than 300 microns. preferably less than 200 microns, more preferably less than 100 microns, especially less than 10 microns. The particle size may even be of sub-micron size. The proper particle size can be obtained by using materials of the appropriate size or by milling the total product in a suitable milling apparatus.

The compositions are substantially non-aqueous, i.e. they contain little or no free water, preferably no more than 5%, preferably less than 3%, especially less than 1% by weight of the total composition. It has been found by the applicants that the higher the water content, the more likely it is for the viscosity to be too high, or even for setting to occur, and also, the more likely for self-heating to occur. However, this may at least in part be overcome by use of deflocculants, especially in relatively high amounts.

Since the objective of a non-aqueous liquid will generally be to enable the formulator to avoid the negative influence of water on the components, e.g. causing incompatibility of functional ingredients, it is clearly necessary to avoid the accidental or deliberate addition of water to the product at any stage in its life. For this reason, special precautions are necessary in manufacturing procedures and pack designs for use by the consumer.

Thus during manufacture, it is preferred that all raw materials should be dry and (in the case of hydratable salts) in a low hydration state, e.g. anhydrous phosphate builder, sodium perborate monohydrate and dry calcite abrasive, where these are employed in the composition. In a preferred process, the dry, substantially anhydrous solids are blended with the liquid phase in a dry vessel. In order to minimise the rate of sedimentation of the solids, this blend is passed through a grinding mill or a combination of mills, e.g. a colloid mill, a corundum disc mill, a horizontal or vertical agitated ball mill, to achieve a particle size of 0.1 to 100 microns, preferably 0.5 to 50 microns, ideally 1 to 10 microns. A preferred combination of such mills is a colloid mill followed by a horizontal ball mill since these can be operated under the conditions required to provide a narrow size distribution in the final product. Of course particulate material already having the desired particle size need not be subjected to this procedure and if desired, can be incorporated during a later stage of processing.

During this milling procedure, the energy input results in a temperature rise in the product and the liberation of air entrapped in or between the particles of the solid ingredients. It is therefore highly desirable to mix any heat sensitive ingredients into the product after the milling stage and a subsequent cooling step. It may also be desirable to de-aerate the product before addition of these (usually minor) ingredients and optionally, at any other stage of the process. Typical ingredients which might be added at this stage are perfumes and enzymes, but might also include highly temperature sensitive bleach components or volatile solvent components which may be desirable in the final composition. However, it is especially preferred that volatile material be introduced after any step of de-aeration. Suitable equipment for cooling (e.g. heat exchangers) and de-aeration will be known to those skilled in the art.

It follows that all equipment used in this process should be completely dry, special care being taken after any cleaning operations. The same is true for subsequent storage and packing equipment.

The present invention will now be illustrated by way of the following Examples.

Two compositions were prepared each with the following 'base' formulation:-

	Parts by weight
Nonionic (1)	36.6
Glyceryl Triacetate	5.0
ABSA (2)	3.0
Sodium Carbonate 0.aq	4.0
Sodium Tripolyphosphate 0.aq	30.0
Sodium Perborate Monohydrate	15.0
EDTA	0.15
SCMC	1.0
TAED	4.0
Minors (3)	0.9

(1) C_{9-11} fatty alcohol alkoxylated with an average of 9 moles of ethylene oxide.

(2) Dodecyl benzene sulphonic (free) acid.

(3) Bleach stabiliser, enzyme, perfume.

To this base formulation various amounts of two different scavengers were added, either by post-dosing or by including with other ingredients at the milling stage.

The sample under test is put into a vacuum flask, which is then placed in an oven which is at a temperature of 100°C. The temperature of the sample is monitored using a fine thermocouple and the rate of temperature rise as the sample passes the oven temperature is noted. This information is then used to determine the rate of heat generation of the sample. The heat generated over the temperature range 50-80°C is a useful indicator for a likely processing temperature range. Using this technique the heat generated from a 200g sample over the temperature range 50 - 80°C was measured and found to be as follows.

Scavenger	Heat generated (KJ)
None	7.37
BHT (0.2% post-dosed)	5.31
Topanol CA (0.3% via mill)	5.36

Claims

1. A substantially non-aqueous liquid cleaning composition comprising a dispersion of solid particles in a liquid phase, characterised in that said composition contains a bleach and a free-radical scavenger agent.

2. A composition according to claim 1, wherein said bleach comprises an inorganic persalt.

3. A composition according to claim 2, further comprising a bleach precursor.

4. A composition according to claim 2 or claim 3, wherein the persalt is sodium perborate.

5. A composition according to claim 4, wherein the perborate is the monohydrate form.

6. A composition according to claim 1, wherein the scavenger is included at from 0.1% to 1.0% by weight of the total composition.

7. A composition according to claim 1, wherein the scavenger is included at from 0.25% to 0.5% by weight of the total composition.

8. A composition according to claim 1, wherein the scavenger is selected from butylhydroxytoluene, 1,1,3-tris(2-methyl-4-hydroxy-5-t-butylphenyl)butane, and mixtures thereof.

9. A composition according to claim 1, wherein the solid particles comprise substantially anhydrous aluminosilicate builder.

10. A composition according to claim 1, further comprising a deflocculant for the particles.