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(54) **IMPROVEMENTS RELATING TO CLEANING COMPOSITIONS**

VERBESSERUNGEN IN BEZUG AUF REINIGUNGSMITTELZUSAMMENSETZUNGEN

AMELIORATIONS RELATIVES A DES COMPOSITIONS DE NETTOYAGE

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Description

Technical Field

The present invention relates to improvements relating to cleaning compositions and in particular to improvements relating to cleaning compositions comprising surfactants and solvents.

Background of the Invention

Many cleaning compositions for use in cleaning of household and industrial hard surfaces comprise solvent components, in addition to surfactants. These solvents are generally intended to improve cleaning performance by assisting in the removal of greasy or waxy soils. The advantages associated with the presence of solvents in such compositions are particularly marked at low surfactant levels, such as are found in compositions for use on highly reflective surfaces upon which high levels of surfactant residues cannot be tolerated.

Many of these solvent components are immiscible with water or have a relatively low level of miscibility above which they form emulsions and therefore those compositions which comprise levels of solvent above the miscibility limit either need to be shaken vigorously prior to use or the solvent needs to be present as a stable emulsion.

One such emulsion is disclosed in US-A-4689168 (The Drackett Company) which discloses anisotropic hard surface cleaning compositions containing volatile silicones, a non-volatile surfactant preferably selected from amongst anionic, nonionic surfactants and mixtures thereof and a polar organic solvent having a boiling point in the range 75-250°C which is preferably ethyl, propyl or butyl alcohol and water.

On shaking these compositions form semi-stable emulsions which break on contact with a hard surface to release the components.

Stable emulsions can be difficult to prepare and are prone to phase-separation. As consumers prefer stable, single phase systems and single phase systems are more readily formulated, processed, stored and dispensed than emulsions, the use of immiscible solvents in single phase compositions has been limited to relatively low levels.

Compositions comprising a binary solvent system of terpenes and polar solvents are described in EP-A-0040882 and EP-A-0080749.

Typical compositions for cleaning glass are described in EP-A-261874 (The Procter and Gamble Company: 1986/87). In that document are described cleaning compositions which comprise a specific isomer of n-butoxy propan-2-ol, available commercially as 'DOWANOL PnB' (RTM, from the DOW Chemical Company). n-butoxy propan-2-ol is miscible with water up to a level of around 6% dependent on temperature and levels of isomers. In that specification it is stated that the use of sprays to deliver the compositions to a surface is to be avoided due to odour problems.

A related later application EP-A-0428816 (P&G: 1989/90) discloses in general terms formulations comprising as a first solvent from 1-9% of ethanol, 0.5-3% of n-butoxy propan-2-ol, 0.5-3% of n-propoxy propanol and, as a second solvent, 0.5-3% of a primary or secondary monoalcohol having a five carbon alkyl chain.

Other systems have comprised emulsions. GB-A-2144763 (P&G: 1983) relates to hard-surface cleaners in the form of a so-called 'microemulsion' of solvent, comprising at least 5% solvent and a magnesium salt. The use of microemulsions has been considered advantageous due to the improved cleaning performance of free solvent as compared with solutions of solvent in water or other aqueous media. Microemulsions are described in that document as very fine emulsions which appear as homogeneous compositions.

Similar emulsion systems are disclosed in EP-A-0347110 (Colgate: 1988): which relates to clear liquid detergents comprising anionics and nonionics, polar solvent consisting of C_1-C_4 alkyl ethers of ethylene or diethylene glycol of mono, di or tripropylene glycol and 2.5-5% fragrance at pH 6-7. The last above-mentioned specification also discusses the detergency enhancing effect of magnesium in formulations containing anionic surfactants.

WO-A-80/02693 discloses compositions of ethyl acetate, glycerol and water with optional surfactant in mixtures which are normally two phase systems except in a narrow formulation band.

EP-A-105063 discloses cleaning compositions which comprise a principal solvent and, when necessary, an auxiliary solvent which is utilized to solubilise the principal solvent. The examples of EP-A-105063 employ, as the water-miscible solvent, diethylene glycol mono-n-butyl ether (commercially available as 'BUTYL DIGOL' (TM)).

US-A-4212758 discloses a cleansing agent which comprises as water-soluble components isopropyl alcohol and 1,2-propandiol, together with oleic acid and water-insoluble ethyl acetate.

US-A-3764544 discloses the use of ethyl acetate or other related acetates as an *ester* solvent, in combination with a coupling agent such as a *glycol ether* solvent.

EP-A-0527625, published on 17.02.93, discloses aqueous liquid compositions comprising ethylene glycol monohexyl ether in an amount which appears to be above its miscibility limit with water and a second volatile solvent (isopropanol) in an amount sufficient to give an isotropic composition.

EP-B-0479908 discloses stable, non-emulsion, cleaning and degreasing compositions which can comprise a rel-

atively insoluble glycol ether solvent present above it's solubility limit and an solubilizing additive which includes and optional non-volatile hydrotropes.

Despite the research which has been conducted in this field a number of technical problems remain.

Where microemulsions are employed they are difficult to produce, but where they are not used insufficient solvent may be present for effective cleaning.

In addition, the use of certain surfactants may lead to a product which are unstable, or appear so, on even short term storage. These products may be discarded by consumers thereby pointlessly releasing surfactants and solvents into the environment.

Moreover, normal use of a surfactant/solvent cleaning composition will increase the environmental loading of solvent and surfactant.

It is therefore desirable to ensure that of the surfactants released into the environment some are readily biodegradable and consequently use of environmentally preferable surfactants in cleaning compositions is preferred. Unfortunately, it has proved difficult to formulate homogeneous solvent-containing systems which comprise these surfactants.

Additionally, the use of lower rather than higher levels of solvent is preferred as this reduces both cost and environmental release of solvent. However, as mentioned above, the use of low levels of solvent can give poor cleaning results.

From the above it can be seen that it is desirable to prepare stable, biodegradable, products which comprise relatively low levels of solvent and which provide the effective cleaning performance associated with higher levels of solvent.

Brief Description of the Invention

We have now devised homogeneneous solvent and surfactant-containing systems which, in use, decompose into emulsions.

Accordingly, the present invention provides a homogeneous, isotropic, aqueous, solvent-containing, cleaning composition wherein the solvent system comprises:

a) a first, glycol ether solvent component in an amount such that it is present at a level above the miscibility limit of that solvent component with water, and,

b) a second solvent component present at a level such that the first solvent component is solubilised in the composition, said second solvent component being sufficiently volatile that, in use, said second solvent component evaporates from the composition to leave a solvent-water emulsion comprising the first solvent component and water.

Detailed Description of the Invention

By using the second, volatile solvent to assist in the solution of the first solvent it is possible to obtain compositions which are clear, stable, isotropic compositions and do not constitute microemulsions. In use of the product, the second solvent component evaporates from the overall composition and the remaining first solvent component and water phase-separate, thus forming an emulsion, whereby the cleaning action of the first solvent component is potentiated. The emulsion thus formed generally has a coarse dispersed phase. This yields the advantages of a stable non-emulsion product as regards storage, dosing and manufacture, employs a relatively low level of solvent and provides the cleaning benefits of a free-solvent system.

First Solvent

The presence of a first solvent component in an amount such that it is present at a level above the miscibility limit of said solvent component with water is an essential feature of the invention.

Preferably, the first solvent component is selected from the group comprising propylene glycol mono n-butyl ether, dipropylene glycol mono n-butyl ether, propylene glycol mono t-butyl ether, dipropylene glycol mono t-butyl ether, diethylene glycol hexyl ether, and mixtures thereof.

Most preferably, the first solvent component is propylene glycol mono n-butyl ether (n-butoxy propan-2-ol), preferably present at a level of 6%-12%.

Second Solvent

The presence of a second, volatile solvent component is an essential feature of the invention.

Preferably, the second solvent component is selected from volatile alcohols; water miscible, volatile glycol ethers, aldehydes, ketones, di-alkyl ethers and mixtures thereof.

More preferably, said second solvent component is selected from the group comprising: methanol, ethanol, isopropyl alcohol, ethylene glycol monobutyl ether and mixtures thereof.

Most preferably, the second solvent component comprises, ethanol, isopropanol or mixtures thereof. Ethanol in the form of industrial methylated spirits is suitable for the practice of the invention.

Surfactants

Surfactants are optional components of formulations according to the present invention although it is desirable that compositions according to the invention further comprise one or more surfactant species.

The nature of the surfactant is not critical to the general function of the invention.

In embodiments of the invention the surfactant species are generally, anionic or nonionic, although it is envisaged that cationic, zwitterionic and amphoteric surfactants can be employed. Mixtures of both anionic and nonionic can be employed.

In particularly preferred embodiments of the present invention the cleaning composition further comprises an anionic surfactant. It is envisaged that a broad range of anionic surfactants can be used in the embodiments of the present invention, some of which are listed below. In each case the anionic surfactant will be present together with a suitable counter-ion.

Preferably the compositions further comprise magnesium ions in an amount corresponding to at least 0.02 M where M is the molar amount of anionic surfactant in the composition.

The magnesium salt of the anionic synthetic detergent to be used in the present invention can be a magnesium salt of the well-known types of anionic detergent surfactants, such as the C_{10}-C_{18} alkylbenzene sulphonates, C_{10}-C_{18} alkanesulphonates, sulphonated C_{10}-C_{22} fatty acids or esters thereof, C_8-C_{18} olefinsulphonates, di-(C_6-C_{10} alkyl) sulphosuccinates, C_{10}-C_{18} alkylsulphates, C_{10}-C_{18} alkylethersulphates containing from 1 to 10 moles of ethylene-oxide. Further examples can be found in Schwartz-Perry "Surface Active Agents and Detergents", Vol. I (1949) and Vol. II (1958).

Particularly, preferred amongst the anionic detergents are the magnesium salts of primary alcohol sulphates. These are believed to be more readily biodegradable than other surfactants and are available in commercial quantities from renewable resources.

Primary alcohol sulphates are mixture of materials of the general formulation:

$$ROSO_3X$$

wherein R is a C_8 to C_{18} primary alkyl group and X is a solubilising cation. Suitable cations include sodium, magnesium, potassium, ammonium and mixtures thereof.

In general, the final composition should comprise from 0.05 to 10% by weight of the magnesium salt of the anionic synthetic detergent, preferably from 0.1 to 7.5% by weight. The magnesium salt of the anionic synthetic detergent may be incorporated as such in the final composition, or may be formed by in-situ neutralisation of the anionic synthetic detergent in acid from with a suitable neutralising magnesium compound such as magnesium-oxide, -hydroxide, -carbonate, etc. The magnesium salt of the anionic synthetic detergent may also be formed in situ by the addition of a magnesium salt such as magnesium sulphate to the alkali-metal ammonium or alkanolamine salt of the anionoic synthetic detergent in the composition.

In addition to, or as an alternative to, anionic surfactants, nonionic surfactants can be employed. The preferred nonionic surfactant is selected from the group comprising ethoxylated alcohols of the general formula:

$$R_1\text{-}(OCH_2CH_2)_m\text{-}OH$$

wherein R_1 is straight or branched, C_8 to C_{18} alkyl and the average degree of ethoxylation (i.e. the ethylene oxide chain length) m is 1-14.

As is illustrated by reference to examples given below, we have determined that particularly effective compositions are formed when the surfactant system consists solely of the magnesium salt of an anionic surfactant, particularly the magnesium salt of a primary alcohol sulphate.

Preferred compositions according to the present invention therefore comprise:

a) the magnesium salt of an anionic surfactant, preferably the magnesium salt of primary alcohol sulphate,

b) 6%-12% wt n-butoxy propanol,

c) water, and,

d) sufficient volatile alcohol to prevent phase separation between the water and the n-butoxy propanol.

Minors

The compositions of the invention can further comprise other components selected from the group comprising: further surfactant species, perfumes, electrolytes, colours and dyes, abrasives, hygiene agents, further solvent components, foam-control agents, viscosity modifying agents, hydrotropes and mixtures thereof. Provided that these components are present at sufficiently low levels they do not interfere with the function of the invention.

Process Aspects of the Invention

It is preferable to spray the compositions directly onto a soiled surface rather than cleaning the surface with a cloth or sponge dampened with the compositions. It is believed that the evaporation of one of the components of the cleaning composition is critical to the use of the inventive compositions in practice and that evaporation proceeds more effectively during the spraying operation and from a surface than from a cloth.

Accordingly, a further aspect of the present invention comprises a process including the steps of:

a) directly treating a surface with a composition according to the present invention,

b) permitting the second solvent component to at least partially evaporate, and,

c) performing a mechanical cleaning operation.

A yet further aspect of the present invention relates to a homogeneneous composition comprising solvent and surfactant which decomposes into a solvent-water emulsion as a portion of the solvent evaporates, packaged in a container adapted to produce a spray.

In order that the present invention may be further understood it will be described hereafter by way of example and with reference to the accompanying figures 1 and 2 wherein;

Figure 1 is a graph showing the cleaning efficiency of commercial n-butoxy propan-2-ol (DOWANOL PnB) with concentration, and,

Figure 2 illustrates the cleaning efficiency of the compositions prepared as examples in graphical form.

EXAMPLES 1-4

Cleaning compositions were prepared as in Table 1 below, all figures being given in wt% on product and being made up to 100% with water. The following abbreviations are used to identify the components mentioned in Tables 1, 2 and 3:

PnB: Dowanol PnB [RTM]: n-butoxy propan-2-ol,

P2L: Pentan-2-ol,

IMS: Industrial methylated spirits: ethanol,

BD: Butyl Digol [RTM]: di ethylene glycol butyl ether

DOB: Dobanol 91-8 [RTM]: nonionic surfactant

NH3: Ammonia

LAS: Linear alkyl sulphonate: surfactant (as ammonium salt).

PAS: Magnesium salt of C_{10}-C_{18} primary alcohol sulphate: anionic surfactant.

NON: Dobanol 91-350FA [RTM]: nonionic surfactant.

From figure 1 it can be seen that the cleaning efficiency of PnB-based compositions is particularly dependent on PnB concentration in the range between 5 and 7 wt% concentration on product. To obtain these results 1.0 ml of each neat sample was applied with a sponge on to soiled Decamel [RTM] tiles (soiled with 80/20 fat/particulate soil at 0.25mg/cm.cm) and wiped using 10 reciprocal Sheen rubbing cycles (76 g/cm.cm applied load). The percentage cleaning efficiency was calculated from reflectance measurements.

The maximum miscibility of PnB with water is around 6%wt and consequently formulations comprising >6%wt are normally phase separated into an aqueous and an excess solvent phase. From Figure 1 it is clear that free solvent is far more effective in cleaning operations than solvent which is dissolved in an aqueous medium.

Single phase compositions were formed by simple mixing of the components according to the formulations given in Table 1, the balance of the formulation being water.

In order to determine the effectiveness of the compositions, 0.6ml of each neat sample was sprayed on to soiled Decamel [RTM] tiles (soiled with 80/20 fat/particulate soil at 0.25mg/cm.cm) and left for one minute before wiping with a sponge cloth using 10 reciprocal Sheen rubbing cycles (76 g/cm.cm applied load). The percentage cleaning efficiency was calculated from tile-surface reflectance measurements. Comparative examples are marked with an asterisk.

TABLE 1

Example	DOB	IMS	BD	PnB
1*	0.09%	-	-	5%
2*	0.09%	20%	-	5%
3	0.09%	13%	-	7%
4*	0.09%	13%	7%	-

Percentage cleaning efficiency results for the above mentioned formulations are shown in figure 2. In decreasing order, cleaning efficiency was 3>2>1>4.

Example 1 is a control experiment to illustrate the base-line cleaning effect of a single phase system containing PnB. The level of PnB in this example has been selected such that it lies below the maximum miscibility with water and consequently the system forms a homogeneous mixture. It can be seen from comparative example 2 that the addition of IMS improves the cleaning performance only slightly.

A significant improvement is attained when the starting concentration of PnB is above the maximum miscibility level, as in example 3. The compositions of example 3 are clear, homogeneous systems which, in use, lose the alcoholic solvent to the ambient and reach a composition at which there is just sufficient alcohol present to solubilise all of the PnB present. At this composition, further loss of volatile solvent results in phase separation of the PnB.

Comparative example 4 shows that when BD, is present below its maximum miscibility in the starting composition cleaning is less effective.

EXAMPLES 5-13

In order to further demonstrate the characteristic features of the present invention a number of known compositions as described in EP-A-0428816 were prepared with the formulations given below in Table 2 and their phase-behaviour on evaporation noted. The balance of each composition was water and the figures quoted are weight percentages on product. Examples 5-12, as marked with an asterisk, are these comparative examples whereas example 13 is an embodiment of the invention, identical to example 3 given above.

TABLE 2

Example	LAS	NH3	IMS	PnB	P2L	DOB
5*	0.1	-	9.0	0.5	0.5	-
6*	0.1	-	9.0	0.5	1.0	-
7*	0.1	-	9.0	0.5	1.5	-
8*	0.1	-	9.0	0.5	2.0	-

Continuation of the Table on the next page

TABLE 2 (continued)

Example	LAS	NH3	IMS	PnB	P2L	DOB
9*	0.1	-	9.0	0.5	2.5	-
10*	0.1	-	9.0	0.5	3.0	-
11*	0.1	0.2	9.0	1.5	1.5	-
12*	0.1	-	8.0	3.0	3.0	-
13	-	-	13	7.0	-	0.09

All samples were clear isotropic liquids at room temperature apart from sample 8 which was cloudy. This sample was therefore excluded from the following.

In separate experiments each sample was applied to a black ceramic tile and spread over the surface with a clean, dry cloth to form a thin film which was allowed to evaporate to dryness. The film was observed closely by eye to determine the formation of any emulsion (indicated by a transformation from a transparent film to an opaque film). The only sample observed to form an emulsion was that of example 13, an embodiment of the invention.

EXAMPLES 14-27

Further examples are given in Table 3 below. Examples 14-27 illustrate the effect of the choice of surfactant on product performance.

To obtain the results listed in Table 3, 1.0 ml of each neat sample was applied with a sponge on to soiled Decamel [RTM] tiles (soiled with 80/20 fat/particulate soil at 0.25mg/cm.cm) and wiped by hand using reciprocal rubbing cycles. The cleaning efficiency was determined in relation to the effort required: 1 corresponds to little effort whereas 5 corresponds to some difficulty in removing the soil. Comparative examples are indicated by an asterisk.

As noted above, the maximum miscibility of PnB with water is around 6%wt and consequently formulations comprising >6%wt PnB are normally phase separated into an aqueous phase and an excess solvent phase. However, in the presence of the cosolvent the formulations of examples 16-19 exhibited a single phase.

TABLE 3

Component Wt.%	PAS	NON	PnB	IPA	IMS	BD	Score Sample
14*	-	0.1	5.0	-	-	-	4.7
15*	0.1	-	5.0	-	-	-	5
16	-	0.1	7	13	-	-	2.3
17	0.1	-	7	13	-	-	1.3
18	-	0.1	7	-	13	-	2.3
19	0.1	-	7	-	13	-	2.3
20*	0.1	-	-	20	-	-	5
21*	-	0.1	-	20	-	-	5
22*	0.1	-	-	-	20	-	5
23*	-	0.1	-	-	20	-	5

Continuation of the Table on the next page

TABLE 3 (continued)

Component Wt.%	PAS	NON	PnB	IPA	IMS	BD	Score Sample
24*	0.1	-	-	-	-	10	5
25*	0.1	-	-	-	-	5	5
26*	0.1	-	-	5	-	5	5
27*	0.1	-	-	-	5	5	5

Examples 14 and 15 are control experiments to illustrate the cleaning effect of a single phase system containing PnB, below the maximum miscibility. The cleaning performance of these compositions appears slightly better in the presence of the nonionic surfactant (comparative example 14) than the anionic surfactant (comparative example 15). This is in agreement with the results noted in respect of comparative example 1 mentioned above.

It can be seen from embodiments 17 and 19 that the addition of IPA or IMS as co-solvents in the presence of a slightly increased level of PnB improves the cleaning performance greatly. This is in agreement with the results discussed above comparing examples 1 and 3 as mentioned above.

Examples 16 and 18 are examples using a nonionic surfactant. Although these compositions had a cleaning performance approaching that of embodiments 17 and 19, the compositions became cloudy on storage. It is to be noted that the anionic surfactant in compositions according to the preferred embodiment of the present invention exhibits better cleaning performance than the nonionic surfactant (compare examples 16 and 17).

Comparative examples 20-27 shows that combinations of solvent which fall outside of the scope of the present invention did not have effective cleaning performance. In these comparative compositions no emulsion was formed on the evaporation of the volatile solvent component.

From the examples given above it can be seen that homogeneous, solvent systems which phase separate to form an emulsion on evaporation of a portion of the solvent give improved cleaning performance over homogeneous systems which comprise similar quantities of solvent but which do not exhibit the phase separation behaviour in use.

Claims

Claims for the following Contracting States : DE, ES, FR, GB, IT, SE

1. Homogeneous, isotropic, aqueous, solvent-containing, cleaning composition wherein the solvent system comprises:

   a) a first, glycol ether solvent component in an amount such that it is present at a level above the miscibility limit of that solvent component with water, and,

   b) a second solvent component other than ethylene glycol monohexyl ether, present at a level such that the first solvent component is solubilised in the composition, said second solvent component being sufficiently volatile that, in use, said second solvent component evaporates from the composition to leave a solvent water emulsion comprising the first solvent component and water.

2. Composition according to claim 1 wherein the first solvent component is selected from the group comprising propylene glycol mono n-butyl ether, dipropylene glycol mono n-butyl ether, propylene glycol mono t-butyl ether, dipropylene glycol mono t-butyl ether, diethylene glycol hexyl ether, and mixtures thereof.

3. Composition according to claim 1 wherein the second solvent component is selected from volatile alcohols; water miscible, volatile glycol ethers, aldehydes, ketones, di-alkyl ethers and mixtures thereof.

4. Composition according to claim 3 wherein the second component is selected from the group comprising: methanol, ethanol, isopropyl alcohol, ethylene glycol monobutyl ether and mixtures thereof.

5. Composition according to claim 1 further comprising a surfactant.

6. Composition according to claim 5 comprising an anionic surfactant.

7. Composition according to claim 6 wherein the anionic surfactant is the salt of primary alkyl sulphate of materials of the general formulation:

$$(ROSO_3).X$$

wherein R is a C_8 to C_{18} primary alkyl group and X is a suitable counterion.

8. Composition according to claim 7 further comprising magnesium ions in an amount corresponding to at least 0.02 M where M is the molar amount of anionic surfactant in the composition.

9. Composition according to claim 5 comprising a nonionic surfactant.

10. Composition according to claim 9 comprising a nonionic surfactant selected from the group comprising ethoxylated alcohols of the general formula:

$$R_1\text{-}(OCH_2CH_2)_m\text{-}OH$$

wherein R_1 is straight or branched, C_8 to C_{18} alkyl and the average degree of ethoxylation (i.e. the ethylene oxide chain length) m is 1-14.

11. Cleaning composition according to claim 1 comprising:

a) 6%-12% wt n-butoxy propanol,

b) water,

c) sufficient volatile alcohol to prevent phase separation between the water and the n-butoxy propanol.

12. Composition according to claim 11 further comprising:

a) the magnesium salt of an anionic surfactant

13. Cleaning process including the steps of:

a) directly treating a surface with a composition according to any one of claims 1-12,

b) permitting the second solvent component to at least partially evaporate, and,

c) performing a mechanical cleaning operation.

14. Composition according to any one of claims 1-12, packaged in a container adapted to produce a spray of said composition.

Claims for the following Contracting States : NL, CH

1. Homogeneous, isotropic, aqueous, solvent-containing, cleaning composition wherein the solvent system comprises:

a) a first, glycol ether solvent component in an amount such that it is present at a level above the miscibility limit of that solvent component with water, and,

b) a second solvent component present at a level such that the first solvent component is solubilised in the composition, said second solvent-component being sufficiently volatile that, in use, said second solvent component evaporates from the composition to leave a solvent water emulsion comprising the first solvent component and water.

2. Composition according to claim 1 wherein the first solvent component is selected from the group comprising propylene glycol mono n-butyl ether, dipropylene glycol mono n-butyl ether, propylene glycol mono t-butyl ether, dipro-

pylene glycol mono t-butyl ether, diethylene glycol hexyl ether, and mixtures thereof.

3. Composition according to claim 1 wherein the second solvent component is selected from volatile alcohols; water miscible, volatile glycol ethers, aldehydes, ketones, di-alkyl ethers and mixtures thereof.

4. Composition according to claim 3 wherein the second component is selected from the group comprising: methanol, ethanol, isopropyl alcohol, ethylene glycol monobutyl ether and mixtures thereof.

5. Composition according to claim 1 further comprising a surfactant.

6. Composition according to claim 5 comprising an anionic surfactant.

7. Composition according to claim 6 wherein the anionic surfactant is the salt of primary alkyl sulphate of materials of the general formulation:

$$(ROSO_3).X$$

wherein R is a C_8 to C_{18} primary alkyl group and X is a suitable counterion.

8. Composition according to claim 7 further comprising magnesium ions in an amount corresponding to at least 0.02 M where M is the molar amount of anionic surfactant in the composition.

9. Composition according to claim 5 comprising a nonionic surfactant.

10. Composition according to claim 9 comprising a nonionic surfactant selected from the group comprising ethoxylated alcohols of the general formula:

$$R_1\text{-}(OCH_2CH_2)_m\text{-}OH$$

wherein R_1 is straight or branched, C_8 to C_{18} alkyl and the average degree of ethoxylation (i.e. the ethylene oxide chain length) m is 1-14.

11. Cleaning composition according to claim 1 comprising:

a) 6%-12% wt n-butoxy propanol,

b) water,

c) sufficient volatile alcohol to prevent phase separation between the water and the n-butoxy propanol.

12. Composition according to claim 11 further comprising:

a) the magnesium salt of an anionic surfactant

13. Cleaning process including the steps of:

a) directly treating a surface with a composition according to any one of claims 1-12,

b) permitting the second solvent component to at least partially evaporate, and,

c) performing a mechanical cleaning operation.

14. Composition according to any one of claims 1-12, packaged in a container adapted to produce a spray of said composition.

Patentansprüche

Patentansprüche für folgende Vertragsstaaten : DE, ES, FR, GB, IT, SE

1. Homogene, isotrope, wässerige Lösungsmittel-enthaltende Reinigungsmittelzusammensetzung, worin das Lösungsmittelsystem enthält:

   (a) Eine erste Glykolether-Lösungsmittelkomponente in einer solchen Menge, daß sie bei einem Gehalt oberhalb der Mischbarkeitsgrenze der Lösungsmittelkomponente mit Wasser vorhanden ist, und,
   (b) eine zweite Lösungsmittelkomponente, verschieden von Ethylenglykolmonohexylether, vorhanden in einer solchen Menge, daß die erste Lösungsmittelkomponente in der Zusammensetzung solubilisiert wird, wobei die zweite Lösungsmittelkomponente ausreichend flüchtig ist, daß, bei der Verwendung die zweite Lösungsmittelkomponente aus der Zusammensetzung verdampft, um eine Lösungsmittel-Wasser-Emulsion zurückzulassen, enthaltend die erste Lösungsmittelkomponente und Wasser.

2. Zusammensetzung nach Anspruch 1, worin die erste Lösungsmittelkomponente aus der Gruppe ausgewählt ist, umfassend Propylenglykolmono-n-butylether, Dipropylenglykolmono-n-butylether, Propylenglykolmono-tert.-butylether, Dipropylenglykolmono-tert.-butylether, Diethylenglykolhexylether, und Mischungen derselben.

3. Zusammensetzung nach Anspruch 1, worin die zweite Lösungsmittelkomponente aus flüchtigen Alkoholen ausgewählt ist; wassermischbaren, flüchtigen Glykolethern, Aldehyden, Ketonen, Dialkylethern, und Mischungen derselben.

4. Zusammensetzung nach Anspruch 3, worin die zweite Komponente aus der Gruppe ausgewählt ist, umfassend: Methanol, Ethanol, Isopropylalkohol, Ethylenglykolmonobutylether, und Mischungen derselben.

5. Zusammensetzung nach Anspruch 1, die ferner ein Surfactant enthält.

6. Zusammensetzung nach Anspruch 5, die ein anionisches Surfactant enthält.

7. Zusammensetzung nach Anspruch 6, worin das anionische Surfactant das Salz von primärem Alkylsulfat von Materialien der allgemeinen nachstehenden Formel:

   $$(ROSO_3).X$$

   ist, worin R eine primäre C_{8-18}-Alkylgruppe und X ein geeignetes Gegenion ist.

8. Zusammensetzung nach Anspruch 7, ferner enthaltend Magnesiumionen in einer Menge, entsprechend zumindest 0,02 M, worin M die molare Menge an anionischem Surfactant in der Zusammensetzung ist.

9. Zusammensetzung nach Anspruch 5, enthaltend ein nichtionisches Surfactant.

10. Zusammensetzung nach Anspruch 9, enthaltend ein nichtionisches Surfactant, ausgewählt aus der Gruppe, umfassend ethoxylierte Alkohole der allgemeinen nachstehenden Formel:

    $$R^1\text{-}(OCH_2CH_2)_m\text{-}OH$$

    worin R^1 geradkettiges oder verzweigtkettiges C_{8-18}-Alkyl bedeutet und der durchschnittliche Ethoxylierungsgrad (d.h. die Ethylenoxid-Kettenlänge) m 1 bis 14 ist.

11. Reinigungsmittelzusammensetzung nach Anspruch 1, enthaltend:

    (a) 6 bis 12 Gewichtsprozent n-Butoxypropanol,
    (b) Wasser,
    (c) ausreichend flüchtigen Alkohol zur Verhinderung einer Phasentrennung zwischen dem Wasser und dem n-Butoxypropanol.

12. Zusammensetzung nach Anspruch 11, ferner enthaltend:

    (a) Das Magnesiumsalz eines anionischen Surfactants.

13. Reinigungsverfahren, welches die nachfolgenden Stufen einschließt:

(a) Direktes Behandeln einer Oberfläche mit einer Zusammensetzung nach einem der Ansprüche 1 bis 12,
(b) Ermöglichen der zweiten Lösungsmittelkomponente, zumindest teilweise zu verdampfen, und,
(c) Durchführen. eines mechanischen Reinigungsverfahrens.

14. Zusammensetzung nach einem der Ansprüche 1 bis 12, verpackt in einem Behälter, angepaßt zur Erzeugung eines Sprühnebels der Zusammensetzung.

Patenansprüche für folgende Vertragsstaaten : CH, LI, NL

1. Homogene, isotrope, wässerige Lösungsmittel-enthaltende Reinigungsmittelzusammensetzung, worin das Lösungsmittelsystem enthält:

(a) Eine erste Glykolether-Lösungsmittelkomponente in einer solchen Menge, daß sie bei einem Gehalt oberhalb der Mischbarkeitsgrenze der Lösungsmittelkomponente mit Wasser vorhanden ist, und,
(b) eine zweite Lösungsmittelkomponente, vorhanden in einer solchen Menge, daß die erste Lösungsmittelkomponente in der Zusammensetzung solubilisiert wird, wobei die zweite Lösungsmittelkomponente ausreichend flüchtig ist, daß, bei der Verwendung die zweite Lösungsmittelkomponente aus der Zusammensetzung verdampft, um eine Lösungsmittel-Wasser-Emulsion zurückzulassen, enthaltend die erste Lösungsmittelkomponente und Wasser.

2. Zusammensetzung nach Anspruch 1, worin die erste Lösungsmittelkomponente aus der Gruppe ausgewählt ist, umfassend Propylenglykolmono-n-butylether, Dipropylenglykolmono-n-butylether, Propylenglykolmono-tert.-butylether, Dipropylenglykolmono-tert.-butylether, Diethylenglykolhexylether, und Mischungen derselben.

3. Zusammensetzung nach Anspruch 1, worin die zweite Lösungsmittelkomponente aus flüchtigen Alkoholen ausgewählt ist; wassermischbaren, flüchtigen Glykolethern, Aldehyden, Ketonen, Dialkylethern, und Mischungen derselben.

4. Zusammensetzung nach Anspruch 3, worin die zweite Komponente aus der Gruppe ausgewählt ist, umfassend: Methanol, Ethanol, Isopropylalkohol, Ethylenglykolmonobutylether, und Mischungen derselben.

5. Zusammensetzung nach Anspruch 1, die ferner ein Surfactant enthält.

6. Zusammensetzung nach Anspruch 5, die ein anionisches Surfactant enthält.'

7. Zusammensetzung nach Anspruch 6, worin das anionische Surfactant das Salz von primärem Alkylsulfat von Materialien der allgemeinen nachstehenden Formel:

$$(ROSO_3).X$$

ist, worin R eine primäre C_{8-18}-Alkylgruppe und X ein geeignetes Gegenion ist.

8. Zusammensetzung nach Anspruch 7, ferner enthaltend Magnesiumionen in einer Menge, entsprechend zumindest 0,02 M, worin M die molare Menge an anionischem Surfactant in der Zusammensetzung ist.

9. Zusammensetzung nach Anspruch 5, enthaltend ein nichtionisches Surfactant.

10. Zusammensetzung nach Anspruch 9, enthaltend ein nichtionisches Surfactant, ausgewählt aus der Gruppe, umfassend ethoxylierte Alkohole der allgemeinen nachstehenden Formel:

$$R^1\text{-}(OCH_2CH_2)_m\text{-}OH$$

worin R^1 geradkettiges oder verzweigtkettiges C_{8-18}-Alkyl bedeutet und der durchschnittliche Ethoxylierungsgrad (d.h. die Ethylenoxid-Kettenlänge) m 1 bis 14 ist.

11. Reinigungsmittelzusammensetzung nach Anspruch 1, enthaltend:

(a) 6 bis 12 Gewichtsprozent n-Butoxypropanol,

(b) Wasser,
(c) ausreichend flüchtigen Alkohol zur Verhinderung einer Phasentrennung zwischen dem Wasser und dem n-Butoxypropanol.

12. Zusammensetzung nach Anspruch 11, ferner enthaltend:

(a) Das Magnesiumsalz eines anionischen Surfactants.

13. Reinigungsverfahren, welches die nachfolgenden Stufen einschließt:

(a) Direktes Behandeln einer Oberfläche mit einer Zusammensetzung nach einem der Ansprüche 1 bis 12,
(b) Ermöglichen der zweiten Lösungsmittelkomponente, zumindest teilweise zu verdampfen, und,
(c) Durchführen eines mechanischen Reinigungsverfahrens.

14. Zusammensetzung nach einem der Ansprüche 1 bis 12, verpackt in einem Behälter, angepaßt zur Erzeugung eines Sprühnebels der Zusammensetzung.

Revendications

Revendications pour les Etats contractants suivants : DE, ES, FR, GB, IT, SE

1. Composition de nettoyage homogène, isotrope, aqueuse contenant un solvant, dans laquelle le système solvant comprend :

(a) un premier solvant éther glycolique en une quantité telle qu'il est présent en une proportion au dessus de la limite de miscibilité de ce solvant avec l'eau et,

(b) un second solvant autre que le monohexyléther d'éthylène-glycol, présent en une proportion telle que le premier solvant est solubilisé dans la composition, ledit second solvant étant suffisamment volatil pour que, à l'emploi, ledit second solvant s'évapore de la composition pour laisser une émulsion solvant/eau comprenant le premier solvant et l'eau.

2. Composition selon la revendication 1, dans laquelle le premier solvant est choisi parmi le mono-n-butyléther de propylène-glycol, le mono-n-butyléther de dipropylène-glycol, le mono-t-butyléther de propylène-glycol, le mono-t-butyléther de dipropylène-glycol, l'hexyléther de diéthylèneglycol et leurs mélanges.

3. Composition selon la revendication 1, dans laquelle le second solvant est choisi parmi les alcools volatils ; les éthers glycoliques, aldéhydes, cétones, éthers dialkyliques et leurs mélanges miscibles avec l'eau, volatils.

4. Composition selon la revendication 3, dans laquelle le second composant est choisi parmi le méthanol, l'éthanol, l'alcool isopropylique, le monobutyléther d'éthylène-glycol et leurs mélanges.

5. Composition selon la revendication 1, qui comprend en outre un tensioactif.

6. Composition selon la revendication 5, qui comprend un tensioactif anionique.

7. Composition selon la revendication 6, dans laquelle le tensioactif anionique est le sel d'alkylsulfate primaire des matières de formule générale :

$$(ROSO_3)X$$

dans laquelle R est un groupe alkyle primaire en C_{8-18} et X est un contre-ion approprié.

8. Composition selon la revendication 7, comprenant en outre des ions magnésium en une quantité correspondant à au moins 0,02 M , M étant la quantité molaire de tensioactif anionique dans la composition.

9. Composition selon la revendication 5, comprenant un tensioactif non ionique.

10. Composition selon la revendication 9, comprenant un tensioactif non ionique choisi parmi les alcools éthoxylés de formule générale :

$$R_1\text{-}(OCH_2CH_2)_m\text{-}OH$$

dans laquelle R_1 est alkyle en $C_{8}\text{-}_{18}$ droit ou ramifié et le degré moyen d'éthoxylation (c'est à dire la longueur de la chaîne oxyde d'éthylène) m est 1-14.

11. Composition de nettoyage selon la revendication 1, comprenant :

(a) de 6 à 12% en poids de n-butoxy-propanol
(b) de l'eau,
(c) un alcool suffisamment volatil pour empêcher la séparation de phases entre l'eau et le n-butoxy-propanol.

12. Composition selon la revendication 11, comprenant en outre :

(a) le sel de magnésium d'un tensioactif anionique.

13. Procédé de nettoyage comprenant les étapes :

a) traiter directement une surface avec une composition selon l'une quelconque des revendications 1 à 12,
b) laisser le second solvant s'évaporer au moins partiellement, et,
c) effectuer une opération de nettoyage mécanique.

14. Composition selon l'une quelconque des revendications 1 à 12, emballée dans un récipient adapté pour produire une pulvérisation de ladite composition.

Revendications pour les Etats contractants suivants : CH, LI, NL

1. Composition de nettoyage homogène, isotrope, aqueuse contenant un solvant, dans laquelle le système solvant comprend :

(a) un premier solvant éther glycolique en une quantité telle qu'il est présent en une proportion au dessus de la limite de miscibilité de ce solvant avec l'eau et,

(b) un second solvant présent en une proportion telle que le premier solvant est solubilisé dans la composition, ledit second solvant étant suffisamment volatil pour que, à l'emploi, ledit second solvant s'évapore de la composition pour laisser une émulsion solvant/eau comprenant le premier solvant et l'eau.

2. Composition selon la revendication 1, dans laquelle le premier solvant est choisi parmi le mono-n-butyléther de propylène-glycol, le mono-n-butyléther de dipropylène-glycol, le mono-t-butyléther de propylène-glycol, le mono-t-butyléther de dipropylène-glycol, l'hexyléther de diéthylèneglycol et leurs mélanges.

3. Composition selon la revendication 1, dans laquelle le second solvant est choisi parmi les alcools volatils les éthers glycoliques, aldéhydes, cétones, éthers dialkyliques et leurs mélanges miscibles avec l'eau, volatils.

4. Composition selon la revendication 3, dans laquelle le second composant est choisi parmi le méthanol, l'éthanol, l'alcool isopropylique, le monobutyléther d'éthylène-glycol et leurs mélanges.

5. Composition selon la revendication 1, qui comprend en outre un tensioactif.

6. Composition selon la revendication 5, qui comprend un tensioactif anionique.

7. Composition selon la revendication 6, dans laquelle le tensioactif anionique est le sel d'alkylsulfate primaire des matières de formule générale :

$$(ROSO_3)X$$

dans laquelle R est un groupe alkyle primaire en C_{8-18} et X est un contre-ion approprié.

8. Composition selon la revendication 7, comprenant en outre des ions magnésium en une quantité correspondant à au moins 0,02 M , M étant la quantité molaire de tensioactif anionique dans la composition.

9. Composition selon la revendication 5, comprenant un tensioactif non ionique.

10. Composition selon la revendication 9, comprenant un tensioactif non ionique choisi parmi les alcools éthoxylés de formule générale :

$$R_1\text{-}(OCH_2CH_2)_m\text{-}OH$$

dans laquelle R_1 est alkyle en C_{8-18} droit ou ramifié et le degré moyen d'éthoxylation (c'est à dire la longueur de la chaîne oxyde d'éthylène) m est 1-14.

11. Composition de nettoyage selon la revendication 1, comprenant :

(a) de 6 à 12% en poids de n-butoxy-propanol
(b) de l'eau,
(c) un alcool suffisamment volatil pour empêcher la séparation de phases entre l'eau et le n-butoxy-propanol.

12. Composition selon la revendication 11, comprenant en outre :

(a) le sel de magnésium d'un tensioactif anionique.

13. Procédé de nettoyage comprenant les étapes :

a) traiter directement une surface avec une composition selon l'une quelconque des revendications 1 à 12,
b) laisser le second solvant s'évaporer au moins partiellement, et,
c) effectuer une opération de nettoyage mécanique.

14. Composition selon l'une quelconque des revendications 1 à 12, emballée dans un récipient adapté pour produire une pulvérisation de ladite composition.

Fig.1.

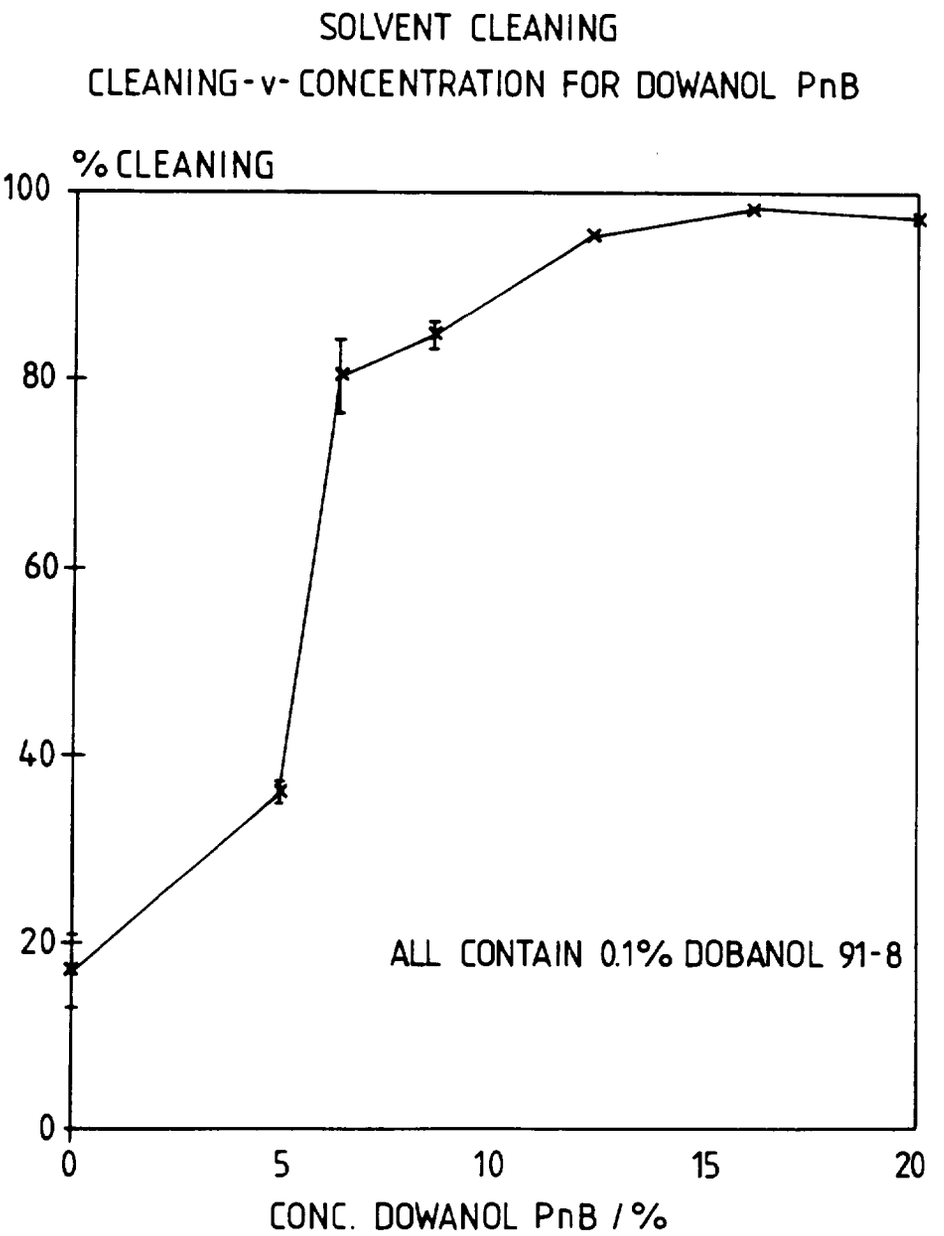
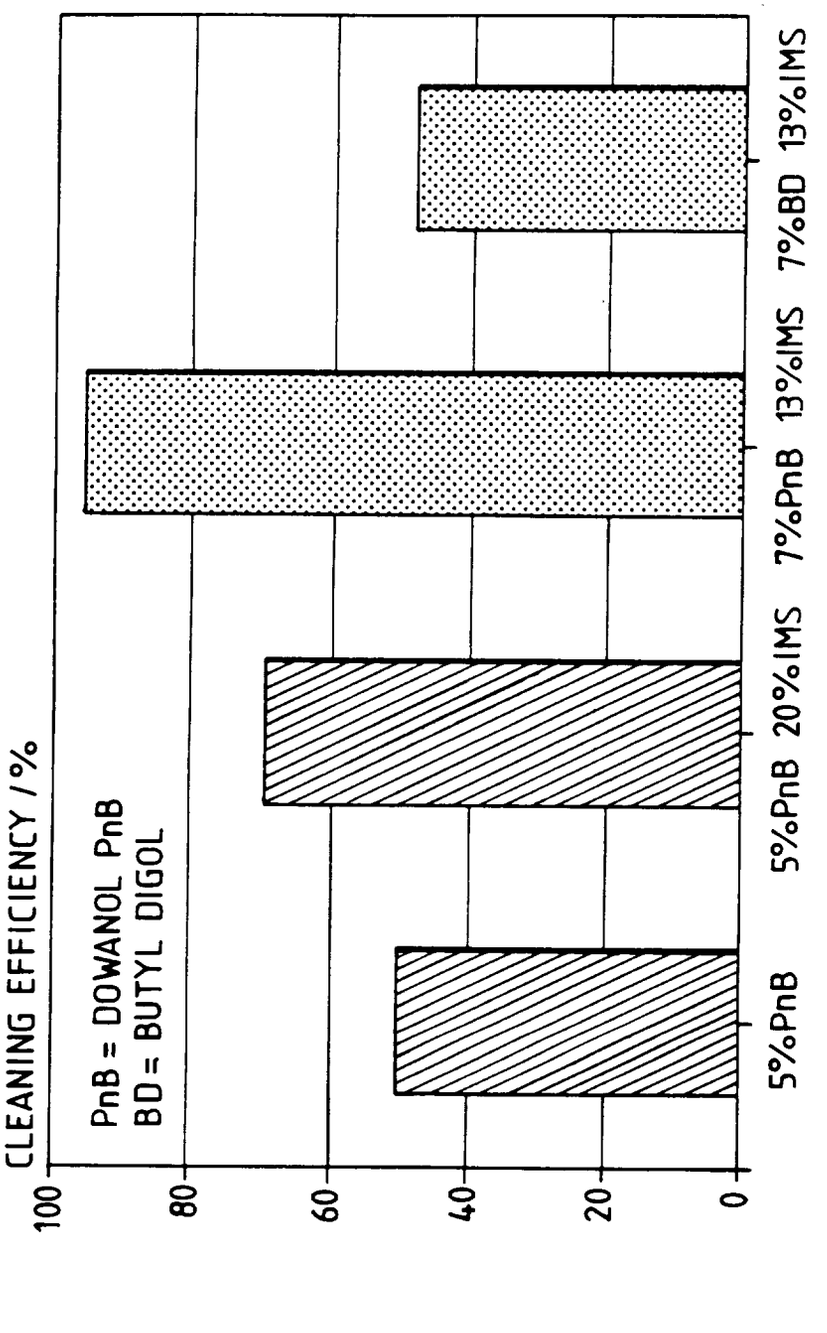

SOLVENT CLEANING
CLEANING-v-CONCENTRATION FOR DOWANOL PnB
% CLEANING
100
80
60
40
20
0
0
5
10
15
20
ALL CONTAIN 0.1% DOBANOL 91-8
CONC. DOWANOL PnB / %

Fig.2.


FATTY SOIL CLEANING :- EFFECT OF FORMING EMULSION IN-SITU
CLEANING EFFICIENCY / %
PnB = DOWANOL PnB
BD = BUTYL DIGOL
100
80
60
40
20
0
5%PnB
5%PnB 20%IMS
7%PnB 13%IMS
7%BD 13%IMS
ALL CONTAIN 0.09% DOBANOL 91-8
0.05mg/sq.cm. SOIL