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<b>(54) Title:</b> IMPROVEMENTS RELATING TO CLEANING COMPOSITIONS		
<b>(57) Abstract</b>  <p>The invention provides a homogeneous, aqueous, cleaning composition which comprises surfactant and solvent, and is characterized in that it forms a solvent-water emulsion on evaporation of at least a portion of the solvent. In such systems the solvent system is selected such that it comprises: a first solvent component in an amount such that it is present at a level above the miscibility limit of that component with water, and, a second solvent component which is sufficiently volatile that, in use, it evaporates from the composition to leave a mixture of the first solvent component and water, said second solvent component being present at a level such that first solvent component is solubilised in the composition. By using the second solvent to assist in the solution of the first solvent it is possible to obtain compositions which are clear, stable, isotropic compositions. In use, the second, volatile 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 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.</p>		

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IMPROVEMENTS RELATING TO CLEANING COMPOSITIONSTechnical Field

The present invention relates to improvements relating to cleaning compositions and in particular to improvements  
5 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  
10 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  
15 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  
20 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 4689168 (The Drackett  
25 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  
30 preferably ethyl, propyl or butyl alcohol and water.

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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  
5 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.

10

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

15 Typical compositions for cleaning glass are described in EP 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  
20 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.

25 A related later application EP 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  
30 alkyl chain.

Other systems have comprised emulsions. GB 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  
35 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.

- 5 Similar emulsion systems are disclosed in EP 0347110 (Colgate: 1988): which relates to clear liquid detergents comprising anionics and nonionics, polar solvent consisting of C<sub>1</sub>-C<sub>4</sub> alkyl ethers of ethylene or diethylene glycol of mono, di or tripropylene glycol and 2.5-5% fragrance at pH 6-  
10 7. The last above-mentioned specification also discusses the detergency enhancing effect of magnesium in formulations containing anionic surfactants.

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

- 15 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  
20 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  
25 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  
30 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  
5 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.

#### 10 Brief Description of the Invention

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

Accordingly, the present invention provides a homogeneous, aqueous, cleaning composition which comprises surfactant and  
15 solvent, and is characterised in that it forms a solvent-water emulsion on evaporation of at least a portion of the solvent.

#### Detailed Description of the Invention

More particularly, we have devised an improved, aqueous,  
20 solvent-containing cleaning composition in which the solvent system comprises:

- a) a first solvent component in an amount such that it is present at a level above the miscibility limit of that solvent component with water, and,
- 25 b) a second solvent component which is sufficiently volatile that, in use, it evaporates from the composition to leave a mixture of the first solvent component and water, said second solvent component being

present at a level such that first solvent component is solubilised in the overall composition.

By using the second, volatile solvent to assist in the solution of the first solvent it is possible to obtain  
5 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  
10 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  
15 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  
20 the invention.

Preferably, the first solvent component is selected from glycol ethers and esters.

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

Most preferably, the first solvent component is propylene  
30 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  
5 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  
10 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.

15 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.

20 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  
25 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<sub>10</sub>-C<sub>18</sub> alkylbenzene sulphonates, C<sub>10</sub>-C<sub>18</sub> alkanesulphonates, sulphonated C<sub>10</sub>-C<sub>22</sub> fatty acids or esters thereof, C<sub>8</sub>-C<sub>18</sub> olefinsulphonates, di-(C<sub>6</sub>-C<sub>10</sub> alkyl) sulphosuccinates, C<sub>10</sub>-C<sub>18</sub> alkylsulphates, C<sub>10</sub>-C<sub>18</sub> 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:

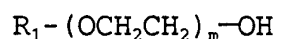


wherein R is a C<sub>8</sub> to C<sub>18</sub> primary alkyl group and X is a solubilising cation. Suitable cations include sodium, magnesium, potassium, ammonium and mixtures thereof.

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  
5 detergent in acid form 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  
10 or alkanolamine salt of the anionic 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  
15 alcohols of the general formula:



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  
20 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  
25 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,
- 30 b) 6%-12% wt n-butoxy propanol,
- c) water, and,

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- 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  
5 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  
10 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  
15 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  
20 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,
- 25 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 homogeneous 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  
5 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  
10 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

15 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:

- 20 PnB: Dowanol PnB [RTM]: n-butoxy propan-2-ol,  
P2L: Pentan-2-ol,  
IMS: Industrial methylated spirits: ethanol,  
BD: Butyl Digol [RTM]: dipropylene glycol butyl ether  
DOB: Dobanol 91-8 [RTM]: nonionic surfactant  
NH3: Ammonia  
25 LAS: Linear alkyl sulphonate: surfactant (as ammonium salt).  
PAS: Magnesium salt of C<sub>10</sub>-C<sub>18</sub> primary alcohol sulphate: anionic surfactant.  
NON: Dobanol 91-350FA [RTM]: nonionic surfactant.

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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.

10 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.

10 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  
15 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,  
20 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.

25 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 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	-
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

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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  
5 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  
10 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  
15 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  
20 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 co-solvent 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
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.

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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.

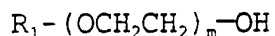
From the examples given above it can be seen that homogeneous, solvent systems which phase separate to form an emulsion on evaporation of a portion of the solvent give improved cleaning performance over homogeneous systems which comprise similar quantities of solvent but which do not exhibit the phase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

CLAIMS

1. Homogeneous, aqueous, cleaning composition comprising solvent, characterised in that it forms a solvent-water emulsion on evaporation of at least a portion of the solvent.  
5
2. Composition according to claim 1 comprising:
  - a) a first solvent component in an amount such that it is present at a level above the miscibility limit of that component with water, and,
  - 10 b) a second solvent component which is sufficiently volatile such that, during use of the composition, the second solvent component evaporates from the composition to at least an extent that an inhomogeneous mixture comprising the first solvent component and water is formed, said second solvent component being present at a level such that first  
15 solvent component is solubilised in the initial composition.
3. Composition according to claim 2 wherein the first  
20 solvent component is selected from glycol ethers and esters.
4. Composition according to claim 3 wherein the first solvent component is selected from the group comprising propylene glycol mono n-butyl ether, dipropylene glycol  
25 mono n-butyl ether, propylene glycol mono t-butyl ether, dipropylene glycol mono t-butyl ether, diethylene glycol hexyl ether, ethyl acetate and mixtures thereof.
5. Composition according to claim 2 wherein the second solvent component is selected from volatile alcohols;  
30 water miscible, volatile glycol ethers, aldehydes, ketones, di-alkyl ethers and mixtures thereof.

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6. Composition according to claim 5 wherein the second component is selected from the group comprising: methanol, ethanol, isopropyl alcohol, ethylene glycol monobutyl ether and mixtures thereof.
- 5 7. Composition according to claim 1 further comprising a surfactant.
8. Composition according to claim 7 comprising an anionic surfactant.
9. Composition according to claim 8 wherein the anionic  
10 surfactant is the salt of primary alkyl sulphate of materials of the general formulation:
- $$(ROSO_3).X$$
- 15 wherein R is a C<sub>8</sub> to C<sub>18</sub> primary alkyl group and X is a suitable counterion.
10. Composition according to claim 9 further comprising magnesium ions in an amount corresponding to at least 0.02 M where M is the molar amount of anionic surfactant  
20 in the composition.
11. Composition according to claim 7 comprising a nonionic surfactant.
12. Composition according to claim 11 comprising a nonionic  
25 surfactant selected from the group comprising ethoxylated alcohols of the general formula:

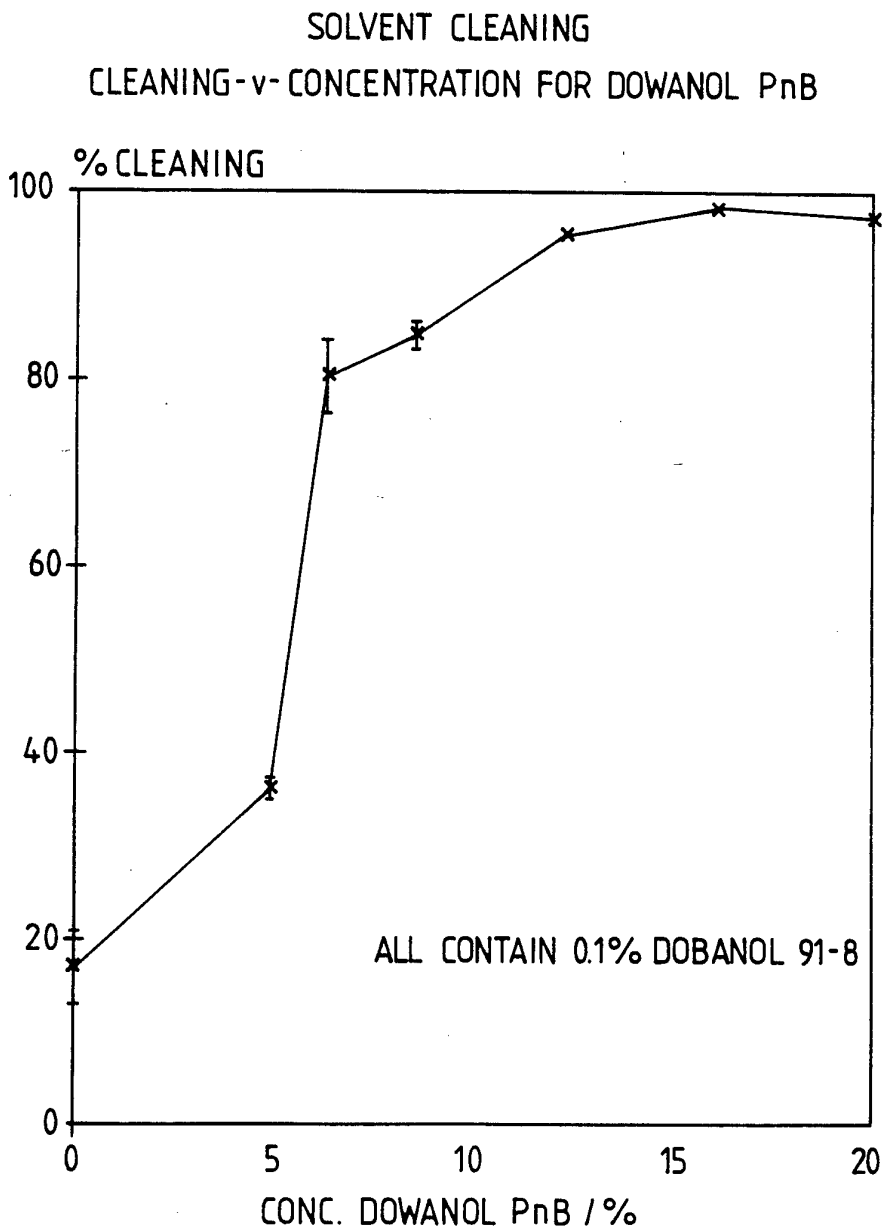


- 30 wherein R<sub>1</sub> is straight or branched, C<sub>8</sub> to C<sub>18</sub> alkyl and the average degree of ethoxylation (i.e. the ethylene oxide chain length) m is 1-14.

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13. 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.
- 5
14. Composition according to claim 13 further comprising:
- a) the magnesium salt of an anionic surfactant
15. Cleaning process including the steps of:
- a) directly treating a surface with a composition according to any one of claims 1-14,
  - b) permitting the second solvent component to at least partially evaporate, and,
  - c) performing a mechanical cleaning operation.
- 10
- 15 16. Composition according to any one of claims 1-14, packaged in a container adapted to produce a spray of said composition.

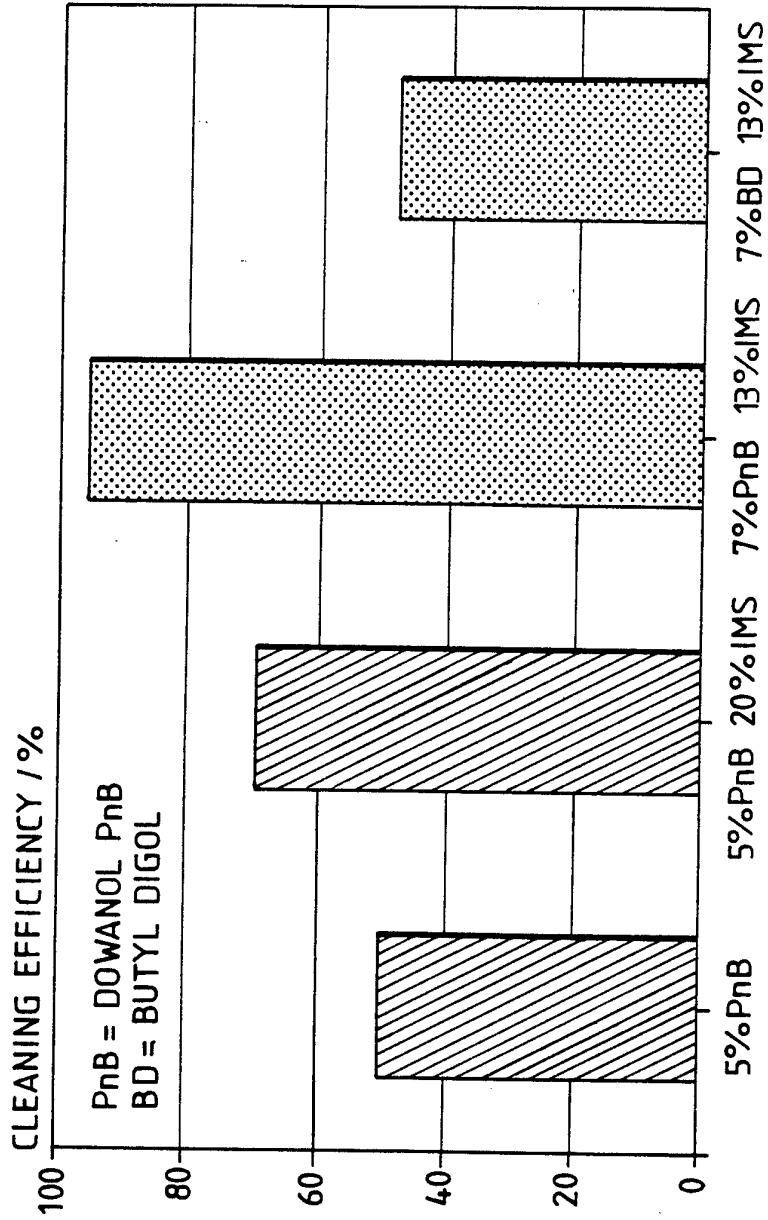
Fig.1.



**SUBSTITUTE SHEET**

Fig.2.

FATTY SOIL CLEANING - EFFECT OF FORMING EMULSION IN-SITU



ALL CONTAIN 0.09% DOBANOL 91-8  
0.05 mg/sq. cm. SOIL

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 93/01330

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl. 5 C11D7/50; C11D3/43; C11D17/00		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	C11D	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>o</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A	GB,A,2 173 508 (BRISTOL MYERS CO.) 15 October 1986 cited in the application see page 3, line 8 - page 6, line 4; claims ---	1,2,5-9, 11,12,15
A	EP,A,0 428 816 (THE PROCTER & GAMBLE CO.) 29 May 1991 cited in the application see the whole document ---	1-8,13, 16
A	US,A,3 764 544 (HAWORTH) 9 October 1973 see the whole document ---	1-7,11, 12
A	US,A,4 212 758 (SHASHKINA ET AL.) 15 July 1980 see the whole document ---	1-7,11, 12,15,16
-/--		
<sup>o</sup> Special categories of cited documents : <sup>10</sup> "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
21 OCTOBER 1993	28. 10. 93	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	SERBETSOGLU A.	



III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	GB,A,2 144 763 (THE PROCTER & GAMBLE CO.) 13 March 1985 cited in the application see the whole document ---	1,2,5-12
A	EP,A,0 105 063 (THE PROCTER & GAMBLE CO.) 11 April 1984 see claims ---	1-9,11, 12
A	WO,A,8 002 693 (TEBAB TEKNISK PRODUKTUTVECKLING) 11 December 1980 see page 9, line 35 - page 10, line 36; claims ---	1-9,11, 12
A	GB,A,2 190 681 (COLGATE - PALMOLIVE CO.) 25 November 1987 see the whole document ---	1-12,15, 16
A	CHEMICAL ABSTRACTS, vol. 99, no. 12, September 1983, Columbus, Ohio, US; abstract no. 89927x, page 98-99 ; see abstract & DD,A,200 470 (KURTZWEG ET AL.) 4 May 1983 ---	1-3,5,11
A	EP,A,0 005 309 (DAWLEY BROOK PAPERS) 14 November 1979 see claims -----	1,2,7,8, 11,15

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

EP 9301330  
SA 74829

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 21/10/93

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US-A-3764544	09-10-73	None	
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