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

(11) Publication number: **0 145 065**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 84201677.6

(22) Date of filing: 20.11.84

(51) Int. Cl.⁴: C 11 D 1/83
C 11 D 1/14, C 11 D 1/22
C 11 D 1/72

(30) Priority: 02.12.83 NL 8304144

(43) Date of publication of application:
19.06.85 Bulletin 85/25

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

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(54) Detergents.

(57) Aqueous detergent concentrate, characterized in that in addition to water it contains an active detergent comprising the following components:

(a) one or more salts of an alkylaryl sulphonic acid,

(b) one or more polyethyleneglycol ethers of primary or secondary alcohols and/or of alkylphenols, and

(c) one or more salts of sulphated alcohols.

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DETERGENTS

The invention relates to aqueous detergent concentrates which, after dilution, preferably after mixing with the desired quantity of water, can be used for cleaning, amongst other things, dishes and fabrics. The concentrates consist of an aqueous solution containing at least three components with cleansing action. These components, which will be specified in greater detail below, are collectively referred to by the term "active detergent".

As is known, it is necessary in practice for both the concentrate and the ready-to-use washing liquid to meet certain requirements in respect of viscosity and transparency point, which is the temperature at which turbidity, caused by precipitation of solids after strong cooling, completely disappears.

Concentrates are convenient for storage and transport, but for the final users it is of course the properties of the washing liquid obtained by dilution that are important. There is a danger that dilution can cause the viscosity to drop excessively, especially if the active detergent consists of alkylaryl sulphonate and one or more polyethyleneglycol ethers of primary or secondary higher alcohols and/or of alkylphenols. A large viscosity drop on dilution is unacceptable for buyers of the detergent concentrates, especially housewives, and should therefore be avoided.

It has now been found that by adding a salt of a sulphate alcohol to a detergent concentrate of the above-mentioned sort, the undesired viscosity drop on dilution can be greatly reduced while retaining a low transparency point.

The invention therefore relates to an aqueous detergent concentrate, characterized in that in addition to water it

contains an active detergent comprising the following components:

(a) one or more salts of an alkylaryl sulphonic acid,

(b) one or more polyethyleneglycol ethers of primary or secondary alcohols and/or of alkylphenols, and

(c) one or more salts of sulphated alcohols.

The detergent concentrate preferably contains at least 10 %wt, and in most cases not more than 70 %wt, relative to the weight of the concentrate, of the active detergent.

The salts of components (a) and (c) are preferably alkali, ammonium and/or amine salts. Alkali salts are most preferred, especially sodium salts.

Component (a) is preferably a salt of an alkylbenzene sulphonic acid, especially of one with 8-16 carbon atoms in the alkyl group. The carbon atoms in the alkyl group in component (a) preferably form a straight chain.

The polyethyleneglycol ethers of primary or secondary alcohols in component (b) preferably satisfy the general formula $R-(OC_2H_4)_nOH$, in which R is an alkyl group with 8-18 carbon atoms and n represents an integer varying from 5 to 12. The carbon atoms in the alkyl group R preferably form a straight chain. The alkylphenols preferably possess 8-16 carbon atoms in the alkyl group; the carbon atoms in this alkyl group preferably form a straight chain. The polyethyleneglycol ethers of alkylphenols preferably contain 2 to 12 ethylene oxide groups.

The salts of component (c) are preferably alkali, ammonium and/or amine salts. Alkali salts are most preferred, especially sodium salts. The alcohol from which component (c) is derived is preferably a primary or secondary alcohol, and more preferably a primary or secondary alkanol with 6-16 carbon atoms per molecule. The carbon atoms in this alkanol preferably form a straight chain.

The previously mentioned undesirable viscosity drop on dilution while retaining a low transparency point is reduced

even more if the active detergent also contains a component (d) consisting of one or more salts of sulphated alcohol ethoxylates and/or of sulphated alkylphenolethoxylates. The salts of component (d) are preferably alkali, ammonium and/or amine salts. Alkali salts are most preferred, especially sodium salts. Component (d) is preferably a sulphated alcohol ethoxylate, such as the sulphated ethoxylate of primary or secondary alcohols with straight or branched chains, especially of alcohol mixtures. Component (d) is preferably a sulphated ethoxylate of C_8-C_{18} alkanols, especially of C_{12}-C_{18} alkanols. The alkanols are preferably primary and have mainly straight chains, i.e. they are less than 30% branched. The most satisfactory alcohols are obtained by hydroformylation of olefins. The sulphated ethoxylates are prepared from these alcohols by first reacting them with ethylene oxide, suitably in such a quantity that on average 1 to 15, especially 2 to 4 mol ethylene oxide per mol alcohol (or alcohol mixture) is added, followed by sulphation of the ethoxylate and neutralization to the sulphated alcohol ethoxylate. Suitable sulphated alkylphenolethoxylates are sulphated C_4-C_{16} alkylphenolethoxylates with an average of 1 to 12, especially 1 to 5 mol ethylene oxide per mol alkylphenol. Mixtures of sulphated alcohol ethoxylates and sulphated alkylphenolethoxylates can also be used.

The composition of the aqueous detergent concentrate according to the invention can vary within wide limits. The most preferred concentrates contain 50-70 %wt of component (a), 5-30 %wt of component (b) and 0.1-25 %wt of component (c). Component (d), if present, is preferably present in a quantity of 0.1-25 %wt. The most preferred concentrates contain 50-70 %wt of component (a), 15-25 %wt of component (b), 1-25 %wt of component (c) and 5-25 %wt of component (d). All weight percentages are calculated as active detergent component on the total of the active detergent.

The previously mentioned viscosity drop on dilution while retaining a low transparency point is reduced even more by the presence of $MgSO_4$ in the concentrate. The quantity of $MgSO_4$ absorbed in the detergent concentrates depends on the nature and the quantities of the other constituents, as well as on the desired viscosity in undiluted and diluted state. In general, preference is given to quantities between 0.05 and 10 %wt relative to the weight of the aqueous concentrate.

An additional advantage of the present invention is that in general no solubilizing agent needs to be added to this aqueous detergent concentrate in order to improve the solubility of the active detergent, so that the composition of the concentrates remains homogeneous during transport and storage, provided that the temperature does not drop to abnormally low levels. A useful criterion in practice is to assume that the transparency point should not be above about 5 °C. If it is nevertheless desired to add a solubilizing agent, use can be made of, for example, ureum, alkanols with 1-4 carbon atoms per molecule, e.g. 2-propanol, and the sodium, potassium, and ammonium salts of arylsulphonic acids substituted with one or more alkyl groups having 1-4 carbon atoms, such as toluene sulphonic acid and xylene sulphonic acid. When using an alkali salt of an alkyl-substituted aryl sulphonic acid, e.g. sodium xylene sulphonate, it can be favourable also to add a lower alcohol, e.g. 2-propanol. The content of solubilizing agent in the concentrates is preferably between 0 and 30 %wt, calculated on the total quantity of active detergent.

The invention will be further illustrated with the aid of the following examples.

EXAMPLES 1-8 and comparative examples A-C

Eleven detergent concentrates were prepared by mixing, at room temperature, water and components (a), (b), (c) and (d) listened in Table I. Component (a) was the sodium salt of "DOBANIC ACID". "DOBANIC ACID" is a trade mark for a mixture of

n-alkylbenze sulphonic acids with 8-13 carbon atoms in the alkyl group. The intermediate product used for its preparation, C_8-C_{13} alkylbenzene, was obtained by alkylation of benzene with a mixture of C_8-C_{13} olefins obtained by thermal cracking of paraffin wax. These olefins consisted mainly of olefins with a terminal double carbon-carbon bond. Component (b) was "DOBANOL" 91-8. "DOBANOL" 91-8 is a trade mark for a mixture of polyethyleneglycol ethers obtained by ethoxylation of linear primary alkanols with 9-11 carbon atoms per molecule and which contain an average of 8 ethylene oxide groups per molecule. The alkanols consist mainly of 80% straight-chained and 20% alkyl (mainly 2-methyl) isomers. Component (c) was "TEEPOL:HB6". "TEEPOL:HB6" is a trade mark for an aqueous solution of a mixture of sodium salts of sulphated primary alkanols. Component (d) was "DOBANOL" 25-3S". "DOBANOL" 25-3S" is a trade mark for a mixture of polyethyleneglycol ethers obtained by ethoxylation of linear primary alkanols with 12-15 carbon atoms per molecule and which contains an average of 3 ethylene oxide groups per molecule.

From each of the eleven concentrates were prepared three diluted aqueous solutions, containing 37, 35 and 30 weight per cent of active detergent. The viscosity (in centistokes at 20 °C) and the transparency point of the thus obtained solutions were determined. The results are given in Table I. It can be seen that for examples 1-8 according to the invention the viscosity drop on dilution is considerably less than for the comparative examples A-C, which are not in accordance with the invention. It can also be seen that a much lower transparency point was observed for the examples than for the comparative examples.

TABLE I

Components	Examples								Comparative examples		
	1	2	3	4	5	6	7	8	A	B	C
	Composition, xx) %wt										
(a) Sodium C_8-C_{13}-n-alkyl benzene sulphonate	58.7	57.3	55.7	54.3	60	60	60	60	80	70	60
(b) Polyethyleneglycol ether of C_9-C_{11}-n-alkanol with average of 8 ethylene oxide groups per molecule	19.5	19.1	18.6	18.1	20	20	20	20	0	0	0
(c) Sodium primary n-C_9-C_{13} alkyl sulphate	2.3	4.5	7.1	9.5	5	10	15	20	20	30	40
(d) Sodium salt of sulphated polyethyleneglycol ether of C_{12}-C_{15}-n alkanols with average of 3 ethylene oxide groups per molecule	19.5	19.1	18.6	18.1	15	10	5	0	0	0	0

xx) active detergent component calculated on total of the active detergent components

TABLE I (cont'd)

Components	Examples								Comparative examples		
	1	2	3	4	5	6	7	8	A	B	C
Active Detergent, %wt	Viscosity in centistokes at 20 °C										
37	830	880	910	960	800	720	670	610	x)	x)	1290
35	940	970	970	1030	840	760	660	590	2720	1790	630
30	1030	980	910	860	840	650	510	380	610	300	99
	Transparency point, °C										
37	+3	+2	+2	+3	+2	+2	+2	+4	x)	x)	+10
35	+1	+1	+2	+2	+1	+1	+2	+3	+10	+9	+8
30	+1	+1	+1	+1	+1	+1	+1	+2	+8	+8	+8

x) heterogeneous mixture

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EXAMPLES 9-12

Four detergent concentrates were prepared by mixing, at room temperature, water and the components listed in Table II. Component (a) contained the sodium salt of "DOBANIC ACID". The intermediate product used for its preparation, C_8-C_{13} alkylbenzene, was obtained by alkylation of benzene with a mixture of linear C_8-C_{13} olefins with mainly non-terminal double carbon-carbon bonds. Components (b), (c) and (d) were the same as those used in examples 1-8. From each of these concentrates were prepared three diluted aqueous solutions, containing 37, 35 and 30 weight per cent active detergent. Of each of the diluted solutions thus obtained, the viscosity was measured in centistokes at 20°C and the transparency point was determined, this being done with the solutions as such and also after addition of 0.2 and after addition of 0.4 %wt $MgSO_4$, calculated on the diluted solution. Table II shows the results obtained. It can be seen that the viscosity drop of the diluted solutions was considerably reduced, especially for the ones to which $MgSO_4$ was added. Moreover, a low transparency point was observed.

TABLE II

Components	Examples			
	9	10	11	12
	Composition*), %wt			
(a)	60	60	60	60
(b)	20	20	10	15
(c)	10	20	20	15
(d)	10	0	10	10

Active Detergent, %wt	Viscosity in centistokes at 20 °C after addition of $MgSO_4$, %wt											
	0	0.2	0.4	0	0.2	0.4	0	0.2	0.4	0	0.2	0.4
37	630	520	450	540	470	410	1140	990	880	820	670	600
35	670	540	470	530	470	410	1000	770	830	820	690	600
30	570	500	460	360	350	330	400	440	460	510	490	490
	Transparency point, °C, after addition of $MgSO_4$, %wt											
37	+2	+2	+1	+5	+5	+4	+6	+6	+6	+4	+5	+6
35	+2	+2	+2	+4	+4	+4	+5	+4	+5	+3	+2	+4
30	+1	+2	+1	+2	+3	+4	+4	+4	+4	+3	+2	+3

*) Calculated as in Table I.

CLAIMS

1. Aqueous detergent concentrate, characterized in that in addition to water it contains an active detergent comprising the following components:

(a) one or more salts of an alkylaryl sulphonic acid,

(b) one or more polyethyleneglycol ethers of primary or secondary alcohols and/or of alkylphenols, and

(c) one or more salts of sulphated alcohols.

2. Detergent concentrate according to claim 1, characterized in that component (a) consists of one or more salts of an alkylbenzene sulphonic acid.

3. Detergent concentrate according to claims 1 or 2, characterized in that the alkylbenzene sulphonic acid contains 8-16 carbon atoms in the alky group.

4. Detergent concentrate according to one or more of the previous claims, characterized in that in component (b) the polyethyleneglycol ethers of primary or secondary alcohols correspond with the general formula $R(OC_2H_4)_n-OH$, in which R represents an alkyl group with 8-18 carbon atoms and n an integer varying from 5 to 12.

5. Detergent concentrate according to one or more of the previous claims, characterized in that in component (c) the alcohol is an alkanol with 6-16 carbon atoms per molecule.

6. Detergent concentrate according to one or more of the previous claims, characterized in that the active detergent also contains a component (d) consisting of one or more salts of sulphated alcoholethoxylates and/or of sulphated alkylphenol-ethoxylates.

7. Detergent concentrate according to claim 6, characterized in that component (d) is a salt of sulphated ethoxylate of C_8-C_{18}-alkanols.

8. Detergent concentrate according to claims 6 or 7, characterized in that component (d) is a sulphate of an alcohol ethoxylate, prepared by reacting 1 mol of an alcohol with 1 to 15 mol ethylene oxide.

9. Detergent concentrate according to one or more of the previous claims, characterized in that the salts in the components (a), (c) and (d) are alkali, ammonium and/or amine salts.

10. Detergent concentrate according to one or more of the previous claims, characterized in that it contains at least 10 %wt, relative to the weight of the concentrate, of the active detergent.

11. Detergent concentrate according to one or more of the previous claims, characterized in that the active detergent contains 50-70 %wt of component (a), 5-30 %wt of component (b) and 0.1-25 %wt of component (c).

12. Detergent concentrate according to claim 11, characterized in that the active detergent also contains 1.5-25 %wt of component (d).

13. Detergent concentrate according to claim 12, characterized in that the active detergent contains 15-25 %wt of component (b), 1-25 %wt of component (c) and 5-25 %wt of component (d).

14. Detergent concentrate according to one or more of the previous claims, characterized in that the alkyl groups present are mainly n-alkyl groups.

15. Detergent concentrate according to one or more of the previous claims, characterized in that the aqueous solution also contains $MgSO_4$.

16. Detergent concentrate according to claim 15, characterized in that the aqueous solution contains 0.05 to 10 %wt, relative to the weight of the solution, of $MgSO_4$.