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(54) A stable concentrated premix and its use for manufacturing aqueous detergent compositions

(57) The present invention relates to a stable concentrated premix comprising water-insoluble materials and surfactants comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10. More specifically a process for manufacturing an aqueous detergent composition comprising the step of preparing said stable concentrated premix is disclosed, said process allowing good production flexibility at reduced costs.

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Description

Technical Field

The present invention relates to a process for manufacturing aqueous detergent compositions suitable for household applications and to a stable concentrated premix used in said process.

Background of the Invention

Liquid detergent compositions comprising surfactants and water-insoluble materials such as perfumes, fatty acids and/or soaps are well known in the art.

Such compositions can be made by a variety of processes wherein for example the different ingredients are incorporated in said compositions at different process steps. Such processes for manufacturing aqueous detergent compositions are not fully satisfying. Indeed, a problem encountered with such fully formulated compositions is the cost of their overall sourcing, e.g. it is often needed to supply different locations with said fully formulated compositions thus having to handle and ship big volumes. Accordingly, there is a need for the development of processes for manufacturing aqueous detergent compositions sourced in the most economical way.

It is thus an object of the present invention to provide a process for manufacturing aqueous detergent compositions comprising a surfactant and water-insoluble materials, said process allowing cheaper and easier sourcing.

We have now found that this object can be met by including in a process for manufacturing an aqueous detergent composition, a step wherein a stable concentrated premix is prepared, said premix comprising most of the active ingredients of the finished detergent compositions. Indeed, in the process of the present invention a stable concentrated premix is prepared by mixing, under alkaline conditions, a surfactant comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10, together with water-insoluble materials such as perfumes, soaps, fatty acids and the like. Such a premix is then diluted to obtain the desired aqueous detergent composition. In its broadest aspect, the present invention is based on the surprising finding that a stable premix can be formulated with a high concentration of actives, including water-insoluble materials, this even without any added water, i.e. other than the water coming from the raw material used. The use of such a premix in the process of the present invention for manufacturing an aqueous detergent composition allows great flexibility in the production chain while also reducing the sourcing cost. Indeed, said premix may advantageously be manufactured in only one site of production and then shipped to the various desired sites, e.g. countries, where said premix may then be turned in the desired finished product by simple dilution. Also, according to the process of the present invention the volume to handle and ship for a given amount of active ingredients is reduced.

An advantage of the stable concentrated premix of the present invention which comprises a surfactant comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10, is that said premix incorporates high amount of water-insoluble materials, this without the need of any hydrotrope or any solubilizer.

Another advantage of the stable concentrated premix of the present invention is that they have good physical stability properties, even across a wide range of temperature, e.g. from 0°C to 50°C.

GB-1329086 discloses conventional methods of making detergent compositions wherein the perfume is solubilized with the aid of a specific surface active agent, an amine oxide or long chain betaine. This patent application does not disclose a process for manufacturing aqueous detergent compositions, wherein a stable concentrated premix comprising a surfactant comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10, together with water-insoluble materials is prepared.

Summary of the Invention

The present invention encompasses a stable concentrated premix having a pH greater than 10 and comprising from 0.1 % to 4% by weight of the total premix of a water-insoluble material, or mixtures thereof, more than 6% by weight of the total premix of a surfactant comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10 and from 55% to 86% by weight of the total premix of water.

The present invention further encompasses a process for manufacturing an aqueous detergent composition comprising from 0.5% to 10% by weight of the total composition of a surfactant comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10, or mixtures thereof, and from 0.1% to 2% by weight of the total composition of a water-insoluble material, or mixtures thereof, said process comprising the steps of:

- preparing under alkaline conditions a stable concentrated premix according to the present invention,
- diluting said premix in water to obtain said detergent composition.

Detailed Description of the Invention

The present invention encompasses a stable concentrated premix having a pH greater than 10 and comprising at least a surfactant comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10, and at least a water-insoluble material. By "stable" it is to be understood herein that the concentrated premix of the present invention does not substantially separate into distinct layers, upon standing for at least 8 weeks at 25 °C. By "concentrated" it is to be understood herein that the level of water present in said premix is from 55% to 86% by weight, preferably from 60% to 85% by weight and more preferably from 65% to 80%.

As a first essential element, the premix of the present invention comprises at least a surfactant comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10, or mixtures thereof. Such surfactants having from 6 to 10 carbon atoms in their hydrophobic portion can be of any type. Such surfactants are able to boost the cleaning performance of any composition comprising them.

Accordingly, suitable surfactants having from 6 to 10 carbon atoms in their hydrophobic portion, for use herein include C_6-C_{10} alkyl sulphates (C_6-$C_{10}SO_4$), alkyl ether sulphates (C_6-$C_{10}(OCH_2CH_2)eSO_4$), alkyl sulphonates (C_6-$C_{10}SO_3$), alkyl succinates (C_6-$C_{10}OOCCH_2CH_2COOZ$), alkyl carboxylates (C_6-$C_{10}COOM$), alkyl ether carboxylates (C_6-$C_{10}(OCH_2CH_2)_eCOOM$), alkyl sarcosinates (C_6-$C_{10}CON(CH_3)R$), alkyl sulpho succinates (C_6-$C_{10}OOCCH(SO_3M)CH_2COOZ$), amine oxides ($C_6$-$C_{10}RR'NO$), glucose amides ($C_6$-$C_{10}CONR''X$), alkyl pyrrolidones ($C_6$-$C_{10}(C_4H_6ON)$, alkylpolysaccharides ($C_6$-$C_{10}OG_g$), alkyl alkoxylates($C_6$_ $C_{10}(OCH_2CH_2)_e(OCH_2CH_2CH_2)_pOH$) and betaines ($C_6$-$C_{10}N^+(CH_3)_2CH_2COO$-). In the formulae in brackets, e and p are independently from 0 to 20 and $e+p>0$, Z is M or R, M is H or any counter ion such as those known in the art, including Na, K, Li, NH_4, amine, X is a polyhydroxyhydrocarbyl having a linear hydrocarbyl chain with at least 3 hydroxyls directly connected to the chain, or an alkoxylated derivative thereof R, R' and R'' are C_1-C_5 alkyl groups, possibly functionalized with hydroxyl groups, R and R' are preferably C_1-C_3, most preferably methyl, R'' is preferably 2-hydroxyethyl or 2 hydroxypropyl, G is a saccharide, preferably glucose, and g is of from 1.5 to 8. All these surfactants are well known in the art. A more complete disclosure of conventional glucose amides can be found for instance in WO 92-06154 and a more complete disclosure of conventional alkyl polysaccharides can be found for instance in US 4,536,319. The premix according to the present invention may comprise any of the above surfactants alone, or any combination thereof, depending on the end use envisioned.

Preferred nonionic surfactants for use herein are alkyl alkoxylates according to the formula C_6-$C_{10}(OCH_2CH_2)_e(OCH_2CH_2CH_2)_pOH$, where e and p representing respectively the degree of ethoxylation and propoxylation, are independently of from 0 to 20, and that $e+p>0$. Most preferred nonionic surfactants for use herein are those where e and p are such that e+p is from 3 to 10, particularly those where p is 0 and e is from 3 to 8. Also, most preferred nonionic surfactants for use herein are those where said hydrophobic portion is a hydrocarbon chain comprising from 7 to 11 carbon atoms.

Said preferred nonionic surfactants for use herein can be manufactured by the processes well known to the man skilled in the art, such as condensation of the corresponding alcohol and alkylene oxide, but such surfactants are more conveniently commercially available for instance from Sidobre under the trade name Mergital® C4 (C8EO4), from Kolb under the trade names Imbentin® AG/810/050 and AG/810/080 (respectively C8-10EO5 and C8-10EO8).

Preferred anionic surfactants for use herein are C_6-C_{10} alkyl sulphates (C_6-$C_{10}SO4$) and alkyl sulphonates (C_6-$C_{10}SO_3$). Most preferred are the C6-C8 alkyl sulphates and sulphonates. Such anionic surfactants can be made by well known sulphation or sulphonation processes followed by neutralization, but said anionic surfactants are more conveniently commercially available, for instance from Rhone Poulenc under the trade name Rhodapono® OLS, or from Witco under the trade name Witconate®.

The most preferred surfactants for use herein are dimethyloctylamine oxide and octyl sulphate. Suitable surfactants for use herein are preferably hypochlorite compatible. According to the present invention, the stable concentrated premix of the present invention comprises more than 6% by weight of the total premix of a surfactant as defined herein, or mixtures thereof, preferably from 6.1% to 15%, more preferably from 6.5% to 12% and most preferably from 6.5% to 10% by weight.

As a second essential element, the premix of the present invention comprises at least a water-insoluble material, or mixtures thereof. By "water-insoluble material" it is to be understood herein any component that is not miscible to water at ambient temperature, i.e. from 20°C to 25°C. In other words incorporating said given component in water at ambient temperature will result in a precipitation of said component in said medium.

Typically the premix of the present invention comprises from 0.1% to 4% by weight of the total premix of a water-insoluble material, or mixtures thereof, preferably from 0.5% to 3% by weight and more preferably from 1% to 2.5% by weight.

Suitable water-insoluble materials to be used herein include the following classes of compounds, soaps and/or fatty acids or perfumes, or colorants, or dyes or mixtures thereof.

Suitable fatty acids to be incorporated in the premix of the present invention include alkali metal salts of a C_8-C_{18} fatty acid. Suitable fatty acids for use herein can be any C_8-C_{18} fatty acid, preferably fully saturated, preferably a sodium, potassium or lithium salt, more preferably the sodium salt. Suitable fatty acids may be selected from caprylic acid, capric

acid, lauric acid, myristic acid, palmitic acid, stearic acid and mixtures of fatty acids suitably hardened, derived from natural sources such as tallow, coconut oil, ground oil and babassu oil. Said fatty acids may be used as an additional thickening aid and as suds suppressers. Typically, the premix according to the present invention comprises from 0.5% to 4%, preferably from 1% to 3% by weight of the total premix of fatty acids.

Suitable perfumes to be incorporated in the premix of the present invention include a perfume as is as well as a perfume blend. Preferred perfumes to be used herein are bleach stable perfumes, especially when said premix is used as raw material in the process of the present invention for manufacturing an aqueous detergent composition comprising beaches. Typically, the premix herein comprises of from 0.2% to 2% by weight of the total premix of said perfume and preferably of from 0.5% to 1%.

A further essential feature of the present invention is the alkalinity of said premix. Indeed, alkalinity plays an important role in the premix stability. Accordingly the premix of the present invention has a pH as is greater than 10, preferably greater than 11, more preferably greater than 12. This is achieved by the addition of from 0.5% to 6% by weight of the total premix of a caustic alkali or mixtures thereof and preferably of from 1.5% to 3%. Suitable caustic alkalis for use herein include sodium and/or potassium hydroxide.

The stable concentrated premix of the present invention may further comprise other ingredients such as long chain amine oxides. This, for example, in an embodiment where the premix according to the present invention may be used as a raw material in order to provide aqueous detergent compositions having particular properties, such as viscous compositions. Preferred long chain amine oxides are according to the formula $R_1R_2R_3NO$ where R_1 is primarily a C_{12}-C_{18} alkyl group and R_2 and R_3 are C_1 to C_3 alkyl groups and even more preferred is to use a mixture of said long chain amine oxides. Indeed, such long chain amine oxides for use herein can be Genaminox^R LA, Gemaminox^R MY-X (available from Hoechst), C_{12}-C_{14} Aromox^R DMMCO-W, (AKZO), Aromox DM14D-W, (AKZO) and Aromox DM14D-W (AKZO). Suitable long chain surfactants for use herein are preferably hypochlorite compatible. Particularly suitable to be used herein is a mixture of said long chain amine oxides, more specifically a mixture of a C_{14} chain amine oxide with a C_{12} chain amine oxide or a C_{16} chain amine oxide, with a ratio of said C_{14} chain amine oxide to said C_{12} chain amine oxide of from 0.3 to 10 and a ratio of said C_{14} chain amine oxide to said C_{16} chain amine oxide of from 0.2 to 4.5. The stable concentrated premix according to the present invention comprises from 0% to 12% by weight of the total premix of said long chain amine oxide, or mixtures thereof. If present said long chain amine oxide are preferably at a level of from 5% to 10% and more preferably of from 6% to 8% by weight of the total premix.

The stable concentrated premix of the present invention may further comprise other optional ingredients such as silicates, silicones, other long chain surface-active agents and the like. This, for example in an embodiment where the premix according to the present invention may be used as a raw material in order to provide aqueous detergent compositions comprising such ingredients. Suitable long chain surface-active agents include organic surface-active agents selected from anionic, nonionic, cationic, and zwitterionic surface-active agents and mixtures thereof and preferred herein are alkyl sarcosinates, paraffin sulphonates, alkyl sulphates and alkyl ether sulphates. Highly preferred optional ingredients are C12 to C14 alkyl sulphates such as sodium dodecyl sulphate or sodium lauryl sulphate.

The stable concentrated premix of the present invention may also comprise a bleaching agent, as an optional highly preferred ingredient. Bleaching agent as mentioned herein includes hypochlorite bleaching agent and preferably an alkali metal hypochlorite. Although alkali metal hypochlorites are preferred, other hypochlorite compounds may also be used herein and can be selected from calcium and magnesium hypochlorite. Preferred alkali metal hypochlorite for use herein is sodium hypochlorite. The premix according to the present invention comprises said hypochlorite bleaching agent, such that the content of active chlorine in the composition is from 0% to 8% and preferably from 0% to 3.5%. According to the present invention the ingredients of the premix are selected so that said premix is hypochlorite compatible.

An advantage of the present invention is that said stable concentrated premix can be used as is in various cleaning applications including for example toilet bowl cleaning and preferably as a raw material suitable to allow the formulation of fully formulated detergent compositions. Accordingly said premix constitutes up to 40% by weight of said detergent composition, preferably from 15% to 40% and more preferably from 25% to 35%.

Accordingly the present invention also encompasses a process for manufacturing an aqueous detergent composition, said process comprising the step of preparing a stable concentrated premix as defined herein before. Said process further comprises a dilution step where said premix is diluted with water. The extent of dilution is at the discretion of the process operator and depends on the aqueous detergent composition desired. Indeed, the process of the present invention allows to manufacture a wide range of aqueous detergent compositions including highly concentrated compositions to non-concentrated compositions, depending on the dilution levels. However, it is preferable in the process of the present invention to dilute until the aqueous detergent composition obtained herein has a concentration of surfactants having from 6 to 10 carbon atoms in their hydrophobic portion, of from 0.5% to 10% by weight of the total detergent composition, preferably of from 1% to 6% and more preferably of from 2% to 5%. Accordingly, the aqueous detergent composition obtained with the process of the present invention comprises from 0.1% to 2% by weight of the total detergent composition of water-insoluble material, or mixtures thereof, preferably from 0.5% to 2% and more preferably from 1% to 1.5%. The dilution stage is conducted at or around ambient temperature. The dilution water often has a temperature of from 15°C to 35° C.

The step of preparing the premix may be conducted by simply adding in lukewarm to warm water (i.e. of from 35°C to approximately 45°C) all of the desired ingredients, i.e. surfactants as defined herein before with water-insoluble materials and the optional ingredients, e.g. silicates and/or long chain surfactants, if present, this in presence of caustic to raise the pH above 10 and while stirring. Alternatively, if the water content of said premix is low, less than 75% by weight of the total concentrated premix, i.e. if not water has been added other than the water coming from the raw material used, the surfactants used in the present invention, having from 6 to 10 carbon atoms in their hydrophobic portion, may be heated up to about 40°C to facilitate dissolution of the water-insoluble materials. Preferred in the process of the present invention the surfactants having from 6 to 10 carbon atoms in their hydrophobic portion are added ahead of the low water solubility ingredients.

In an embodiment of the present invention where a bleaching agent is desired in the aqueous detergent compositions obtained according to the process of the present invention, said bleaching agent is preferably added as the last ingredient in said process, thereby ensuring longest possible market life for said compositions.

In another embodiment of the process of the present invention for manufacturing aqueous detergent compositions, the perfumes and/or colorants and/or dyes are preferably added during or after the dilution step, thereby ensuring great flexibility in adapting the aqueous detergent compositions to different market places.

The aqueous detergent compositions obtained according to the process of the present invention may be used for a variety of cleaning purposes in any hard surfaces application including toilet bowl cleaning, in dishwashing applications, including hand dishwashing as well as washing with automatic dishwashing machines. Said compositions are suitable to be used as a pretreatment composition for treating dishes especially pans, pots kitchen grills and/or any kitchenware soiled by though food stains/encrustations.

Examples

The following premix according to the present invention were prepared.

Premix (% weight)	I	II	III	IV	V	VI	V
C12/14 amine oxide	/	/	/	8	6	8	/
C14 amine oxide	6	5	4.5	/	/	/	/
C16 amine oxide	4	4.5	3	/	0.3	/	/
octyl sulphate	7	9	5	7	6.5	8	7.5
C8/C10 amine oxide	3	/	2	/	/	/	/
fatty acid	1.1	1.4	0.9	1	1.5	1	2.2
sodium hydroxide	0.6	2.6	4	3	2	3	3
perfume	/	0.8	0.8	0.7	0.5	0.7	0.7
Silicate	1	1	1	/	/	/	1
Water	----------up to 100----------						

According to the process of the present invention the above mentioned premix were prepared by simply mixing in warm water (about 45°C) the surfactants comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10. The resulting mix was maintained at this temperature while pre-melted fatty acid was added with stirring. This was followed by addition of caustic soda and perfume under agitation. After a few minutes of stirring to ensure complete dissolution of the water-insoluble materials, the long chain surfactants (e.g. amine oxide) were added if desired. The resulting premix was allowed to stir for another 30 minutes.

All the above mentioned concentrated premix were stable.

The above mentioned premix were diluted with water to yield aqueous detergent compositions, i.e. the finished products. Indeed, the above premix were diluted with water at 1:3 ratio (three parts of water for each part of premix).

Claims

1. A stable concentrated premix having a pH greater than 10 and comprising from 0.1% to 4% by weight of the total premix of a water-insoluble material, or mixtures thereof, more than 6% by weight of the total premix of a surfactant

comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10, or mixtures thereof, and from 55% to 86% by weight of the total premix of water.

2. A premix according to claim 1 wherein said surfactant is a C6-C8 alkyl sulphate and/ or sulphonates, preferably octyl sulphate.

3. A premix according to any of the preceding claims wherein said water-insoluble material includes perfumes, colorants, dyes, fatty acid and/or soaps.

4. A premix according to any of the preceding claims, comprising from 6.1% to 15% by weight of the total premix of said surfactant, or mixtures thereof, preferably from 6.5% to 12% by weight and more preferably from 6.5% to 10% by weight.

5. A premix according to any of the preceding claims, comprising from 0.5% to 3% by weight of the total premix of said water insoluble material, or mixtures thereof and preferably from 1% to 2.5% by weight.

6. A premix according to any of the preceding claims, wherein said premix has a pH as is greater than 11 and preferably greater than 12.

7. A premix according to any of the preceding claims, wherein said premix further comprises optional ingredients including silicates, silicones, long chain amine oxides or other long chain surface-active agents or mixtures thereof, said long chain surface-active agents including anionic, nonionic, cationic, zwitterionic surface-active agents, or mixtures thereof.

8. A premix according to claim 7, wherein said anionic surfactants are alkyl sarcosinates, paraffin sulphonates, alkyl sulphates, alkyl ether sulphates, or mixtures thereof preferably C12 to C14 alkyl sulphates and more preferably sodium dodecyl sulphate and sodium lauryl sulphate.

9. A premix according to claims 7 or 8 wherein said long chain amine oxides are according to the formula $R_1R_2R_3NO$ wherein R_2 and R_3 are independently C_1-C_3 alkyl groups and R1 is C12-C18 alkyl group.

10. A premix according to any of the present claims wherein said premix further comprises a bleaching agent preferably an alkali metal hypochlorite.

11. A process for manufacturing an aqueous detergent composition comprising from 0.5% to 10% by weight of the total composition of a surfactant comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10, and from 0.1% to 2% by weight of the total composition of a water-insoluble material or mixtures thereof, said process comprising the steps of:

- preparing under alkaline conditions a stable concentrated premix according to any of the claims 1 to 9,
- diluting said premix with water to obtain said detergent composition.

12. A process according to claim 11 wherein said process comprises as the last step the addition of a bleaching agent, preferably of an alkali metal hypochlorite.

13. A process according to claims 11 or 12 wherein said premix is prepared by adding in warm water of temperature from 35°C to 45°C, under alkaline conditions, said surfactants comprising a hydrophobic portion and a hydrophilic portion, wherein the length chain of said hydrophobic portion is C6-C10, said water-insoluble materials, and optionally said optional ingredients while stirring.

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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 2726

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE-A-40 25 065 (HENKEL KGAA.) 13 February 1992 * the whole document * ---	1-4,7,8, 11	C11D1/00 C11D1/14 C11D1/83 C11D3/395
X	DE-A-42 37 178 (HENKEL KGAA.) 5 May 1994 * the whole document * ---	1,3,7,8, 11	
A	WO-A-93 15172 (HENKEL CORP.) 5 August 1993 * page 5, line 11 - line 15; claims 1-11,15-19 * ---	1-3,7,8	
A	WO-A-94 10272 (THE PROCTER & GAMBLE CO.) 11 May 1994 * page 7, line 12 - page 8, line 38 * * page 10, line 25 - line 27 * * claims; example VII * ---	1-3,6-10	
A	US-A-5 196 146 (FARELLA JOANNA M. ET AL.) 23 March 1993 * column 8, line 22 - line 54 * * claims 24-35 * ---	1,7	TECHNICAL FIELDS SEARCHED (Int.Cl.6) C11D
A	US-A-4 404 040 (WANG YUEH) 13 September 1983 * the whole document * ---	1-3,7	
A	US-A-4 129 514 (CAFFAREL JEAN-CLAUDE ET AL.) 12 December 1978 * column 5, line 16 - line 29 * * claims 1,10 * ---	1,3,4,7	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 October 1995	Serbetsoglou, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
L : document cited for other reasons

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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 2726

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	GB-A-1 458 798 (THE PROCTER & GAMBLE CO.) 15 December 1976 * page 3, line 89 - page 4, line 27 * * claims *	1-3,7-9	
A	EP-A-0 244 006 (UNILEVER NV.) 4 November 1987 * page 4, line 34 - line 42; claims *	1,3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)

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THE HAGUE	30 October 1995	Serbetsoglou, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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& : member of the same patent family, corresponding document

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