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**Softening and bleaching detergent compositions containing amide softening agent.**

Bleaching detergent compositions containing a peroxy-acid bleaching compound and a narrowly defined amide softening agent are disclosed. The compositions of the invention are capable of providing various fabric care benefits, inclusive of softness, independently from and in presence of peroxyacid bleaching agents.

SOFTENING AND BLEACHING DETERGENT COMPOSITIONS  
CONTAINING AMIDE SOFTENING AGENT

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Technical Field

The present invention relates to softening detergent compositions containing a peroxyacid-bleaching compound, and a narrowly-defined amide softening agent.

The compositions herein, in addition to providing good cleaning performance, exhibit excellent through-the-wash softening properties, and provide additional fabric-care benefits such as anti-static, anti-wrinkling, ease-of-ironing, color stability, independently from and in presence of peroxyacid bleaching agents.

### Background of the invention

Formulators of fabric treatment compositions have long sought means for simultaneously washing and softening fabrics. Among the various approaches suggested are methods employing clay softeners, or amine materials, or both ingredients in combination, such as described in e.g.: German Patents 29.64.114, 28.57.16, 24.39.541, 23.34.899 and European Patents O 026 528 and O 028 432.

Amines have been used in combination with soaps (U.K. patent 1 514 276) fatty acids (published E.P.A. O 133 804) or phosphate esters (published E.P.A. O 168 889) as through-the-wash softeners.

It has been found, however, that the presence of peroxyacid-bleach compounds in softening detergent compositions is often detrimental to the stability of the amine softening agent. As a consequence, the utilization of peroxyacid bleaching agents, inclusive of peroxygen bleach-activator combinations, was in such compositions often limited in quantity, and optimum performance could therefore not be obtained. In addition, the softening amine is not well-compatible with peroxyacids, and becomes deactivated as a softener.

Carboxy-amides have been used as antistatic agents in industrial textile treatment (German patent 30 43 618) and N-alkyl isostearamides as antistatic agents in laundry application (French patent 2,531,447).

Japanese patent J5 8144-175-A discloses the industrial treatment of textile by cationic softening agents and ethoxylated fatty acid amides.

Alkoxyated fatty amides are known as surfactants (EP O 000 595) and as viscosity control agents (EP O 112 719).

German Patent Application 19 59 007 discloses the use as softening agent of a monoethanolamide. German Patent Application 33 10 417 discloses the use of fatty acids diethanolamides as antistatic/non-yellowing agents.

It is an object of the present invention to provide detergent compositions capable of providing excellent cleaning, softening, and fabric-care properties.

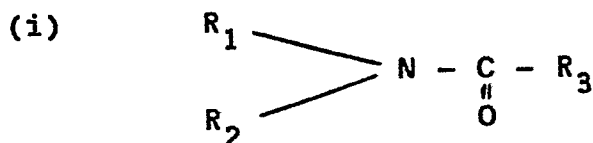
It is another object of the invention to formulate peroxyacid-containing detergent compositions capable of providing simultaneous cleaning and softening benefits.

It has now been discovered that the objects set forth above can be met by using certain amides as softening agents to thereby avoid interaction with peroxyacid bleaching agents and thus provide excellent results in both cleaning and softening of fabric, as well as other "fabric care" benefits.

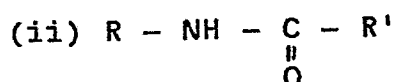
#### Summary of the invention

The present invention relates to detergent compositions capable of giving through-the-wash fabric-care benefits inclusive of softness, containing a surfactant, a nitrogen-containing fabric softener, a bleaching compound and, if desired deterative additives, and are characterized in that

- a) the nitrogen-containing softener is an amide having the formula:



wherein  $R_1$  and  $R_2$  are, selected independently,  $C_{1-8}$  alk(en)yl, hydroxyalkyl, aryl, or alkyl-aryl groups,  $R_3$  is hydrogen, or a  $C_{1-22}$  alk(en)yl, aryl or alkyl-aryl group,  $O-R_4$ , wherein  $R_4$  is a  $C_{1-22}$  alk(en)yl, aryl or alkyl-aryl group,  $R_3$  and  $R_4$  possibly containing functional groups, selected from hydroxy, ester, ether, amide and amine groups,  $R_1$ ,  $R_2$ ,  $R_3$  each containing from 0 to 10 ethylene oxide units; the aryl groups can possibly be derived from hetero-cyclic compounds; with the proviso that the sum of carbon atoms in  $R_1 + R_2 + R_3$  is equal to or greater than 14;

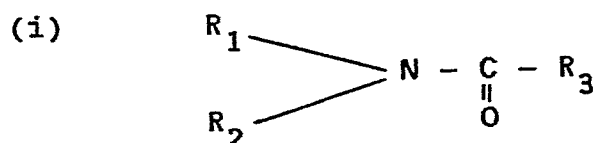


wherein  $R$  and  $R'$  are straight chain alk(en)yl aryl, or alkyl-aryl group, each containing from 8 to 22 carbon atoms;

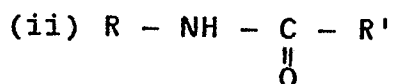
- b) the bleaching compound is represented by a peroxyacid bleaching agent.

#### Detailed Description of the Invention

The amide softening agent - The amide softening agents for use in the present invention can be represented by the formula:



wherein  $R_1$  and  $R_2$  are selected independently,  $C_{1-8}$  alk(en)yl, hydroxy-alkyl, aryl, or alkyl aryl groups,  $R_3$  is hydrogen, or a  $C_{1-22}$  alk(en)yl, aryl or alkyl-aryl group,  $O-R_4$ , wherein  $R_4$  is a  $C_{1-22}$  alk(en)yl, aryl or alkyl-aryl group;  $R_3$  and  $R_4$  possibly containing functional groups, selected from hydroxy, ester, ether, amide and amine groups;  $R_1$ ,  $R_2$ ,  $R_3$  each containing from 0 to 10 ethylene oxide units; the aryl groups can possibly be derived from hetero-cyclic compounds; with the proviso that the sum of carbon atoms in  $R_1 + R_2 + R_3$  is equal to or greater than 14; or



wherein  $R$  and  $R'$  are straight chain alk(en)yl, aryl, or alkyl aryl groups containing from 8 to 22 carbon atoms.

Preferred amides of the formula (i) contain more than 8 carbon atoms in the  $R_3$  group.

Specific examples of preferred species of formula (i) include N,N-dimethyl tallowamide, N,N-dimethyl lauramide, N,N-dimethyl palmitamide, N,N-dimethyl stearamide, N,N-diethyl tallowamide, N,N-dimethyl cocoalkylamide, N,N-diethyl cocoalkylamide, N,N-diethanol cocoalkylamide, N,N-diethanol lauramide, polyoxyethylated stearamide, polyethoxyethylated tallowamide.

Most preferred are N,N-dimethyltallowamide, N,N-diethyltallowamide, N,N-dimethyl cocoalkylamide, N,N-diethyl cocoalkylamide, N,N-diethanoltallowamide.

Preferred amides of the formula (ii) include N-cocoalkyl stearamide, N-decyl stearamide, N-cocoalkyl lauramide, N-tallow tallowamide, N-decyl tallowamide.

The amide softening agent is used at levels of from 0.1% to 15% by weight, preferably from 1 to 10% by weight of the detergent composition, most preferably from 3% to 6%.

In a highly preferred embodiment of the present invention, the amide softening agent is pre-mixed with a dispersing agent, and the resulting mixture is then added to the rest of the composition.

Any conventional dispersing agent with a suitable HLB value can be used herein. Examples are nonionic surfactants resulting from the condensation of primary or secondary aliphatic alcohols or alkyl phenol, with polyethylene oxide. Specific examples include the condensation products of tallow alcohol with 5 to 12 ethylene oxide units in the molecule.

Suitable as dispersing agents are also phosphate esters described in European patent application n° 85201127.9, such as those of the formula:  $R'-O(CH_2-CH_2O)_mPO(OH)_2$ , with  $R'=C_{12-14}$  and  $m=1-5$ , sold under the Trade Name "Servoxyl VPAZ".

However, it is a preferred embodiment of the present invention to use fatty acids as dispersing agents for the amide softening agent.

Fatty acids like lauric, myristic, palmitic, stearic, oleic acids and mixtures thereof can advantageously be used in the present context.

Especially preferred is a mixture of palmitic and stearic acids.

Fatty acids dispersing agents are used most preferably in a weight ratio of 1/1 to 10/1 of amide softening agent to fatty acid.

Softener Clay - The amide softening agent is preferred, but not limited, for use in combination with a detergent-compatible clay softener. Such clay softeners are well-known in the detergency patent literature and are in broad commercial use, both in Europe and in the United States. Included among such clay softeners are various heat-treated kaolins and various multi-layer smectites. Preferred clay softeners are smectite softener clays that are described in German Patent Application 23 34 899 and in U.K. Patent 1,400,898, which can be referred to for details. Softener clays are used in the preferred compositions at levels of at least 1%, generally 1-20%, preferably 2-10%.

Deterasive surfactants - The compositions of this invention will typically contain organic surface-active agents ("surfactants") to provide the usual cleaning benefits associated with the use of such materials.

Deterasive surfactants useful herein include well-known synthetic anionic, nonionic, amphoteric and zwitterionic surfactants. Typical of these are the alkyl benzene sulfonates, alkyl- and alkylether sulfates, paraffin sulfonates, olefin sulfonates, alkoxylated (especially ethoxylated) alcohols and alkyl phenols, amine oxides, alpha-sulfonates of fatty acids and of fatty acid esters, and the like, which are well-known from the detergency art. In general, such deterasive surfactants contain an alkyl group in the  $C_9$ - $C_{18}$  range; the anionic deterasive surfactants can be used in the form of their sodium, potassium or triethanolammonium salts; the nonionics generally contain from about 5 to about 17 ethylene oxide groups. U.S. Patent 4,111,855 contains detailed listings of such typical deterasive surfactants.  $C_{11}$ - $C_{16}$  alkyl benzene sulfonates,  $C_{12}$ - $C_{18}$  paraffin-sulfonates and



alkyl sulfates, and the ethoxylated alcohols and alkyl phenols are especially preferred in the compositions of the present type.

Also useful herein as the surfactant are the water-soluble soaps, e.g. the common sodium and potassium coconut or tallow soaps well-known in the art.

The surfactant component can comprise as little as 1% of the compositions herein, but preferably the compositions will contain 5% to 40%, more preferably 10% to 30%, of surfactant. Mixtures of the ethoxylated nonionics with anionics such as the alkyl benzene sulfonates, alkyl sulfates and paraffin sulfonates are preferred for through-the-wash cleansing of a broad spectrum of soils and stains from fabrics.

Bleaching compound - The bleaching compound in the context of the present invention is represented by a peracid bleaching agent. In the context of the present invention, peroxyacid bleaching agent encompasses both a peroxyacid per se and systems which are able to yield peroxyacids in situ.

Peroxyacids "per se" are meant here to include the alkaline and alkaline-earth metal salts thereof. Peroxyacids and diperoxyacids are commonly used; examples are diperoxydodecanoic acid (DPDA) or peroxyphthalic acid.

Systems capable of delivering peracids in situ consist in a peroxygen bleaching agent and an activator therefor.

The peroxygen bleaching agents are those capable of yielding hydrogen peroxide in an aqueous solution; those compounds are well-known in the art, and include hydrogen peroxide, alkali-metal peroxides, organic peroxide bleaching

agents such as urea peroxide, inorganic persalt bleaching agents such as the alkali metal perborates, percarbonates, perphosphates, persilicates, and the like.

Preferred are sodium perborate, commercially available in the form of mono- and tetra-hydrates, sodium carbonate peroxyhydrate, sodium pyrophosphate peroxyhydrate, urea peroxyhydrate.

The liberated hydrogen peroxide reacts with the bleach activator to form the peroxyacid bleach. Classes of bleach activators include esters, imides, imidazoles, oximes, and carbonates. In those classes, preferred materials include methyl o-acetoxy benzoates; sodium-p-acetoxy benzene sulfonates such as sodium 4-nonanoxyloxybenzene sulfonate; sodium-4-octanoxyloxybenzene sulfonate, and sodium-4-decanoxyloxybenzenesulfonate; biophenol A diacetate; tetra acetyl ethylene diamine; tetra acetyl hexamethylene diamine; tetra acetyl methylene diamine.

Other highly preferred peroxygen bleach activators which are disclosed in U.S. Patents 4,483,778 and 4,539,130, are alpha-substituted alkyl or alkenyl esters, such as sodium-4(2-chlorooctanoxyloxy)benzene sulfonate, sodium 4-(3,5,5-trimethyl hexanoxyloxy)benzene sulfonate. Suitable peroxyacids are also peroxygen bleach activators such as described in published European Patent Application N° O 166 571, i.e., compounds of the general type  $RXAOOH$  and  $RXAL$ , wherein R is a hydroxycarbyl group, X is a hetero-atom, A is a carbonyl bridging group and L is a leaving group, especially oxybenzenesulfonate.

Deterasive adjuncts - The compositions herein can contain other ingredients which aid in their cleaning performance. Through-the-wash detergent compositions contain a detergent

builder and/or metal ion sequestrant. Compounds classifiable and well-known in the art as detergent builders include the nitrilotriacetates, polycarboxylates, citrates, water-soluble phosphates such as tri-polyphosphate and sodium ortho- and pyro-phosphates, silicates, and mixtures thereof. Metal ion sequestrants include all of the above, plus materials like ethylenediaminetetraacetate, the amino-polyphosphonates and phosphates (DEQUEST) and a wide variety of other poly-functional organic acids and salts too numerous to mention in detail here. See U.S. Patent 3.579.454 for typical examples of the use of such materials in various cleaning compositions. In general, the builder/sequestrant will comprise about 0.5% to 45% of the composition. The 1-10 micron size zeolite (e.g. zeolite A) builders disclosed in German Patent 24 22 655 are especially preferred for use in low-phosphate or non-phosphate compositions.

The laundry compositions herein also preferably contain enzymes to enhance their through-the-wash cleaning performance on a variety of soils and stains, such as amylase & protease enzymes. Amylase and protease enzymes suitable for use in detergents are well-known in the art and in commercially available liquid and granular detergents. Commercial deterative enzymes (preferably a mixture of amylase and protease) are typically used at levels of 0.001% to 2%, and higher, in the present compositions. Other highly desirable detergent ingredients for use in the detergent compositions of the present invention are quaternary ammonium compounds of the form  $R_4R_3R_6R_7N^+X^-$ , wherein  $R_4$  is alkyl having from 10 to 20, preferably from 12-18 carbon atoms, and  $R_5, R_6$  and  $R_7$  are each  $C_1$  to  $C_4$  alkyl preferably methyl:  $X^-$  is an anion, e.g. chloride. Examples of such quaternary ammonium compounds include  $C_{12}$ - $C_{14}$  alkyl trimethyl ammonium chloride and cocoalkyl trimethyl ammonium methosulfate. The quaternary ammonium compounds can be used at levels from 0.5% to 5%, preferably from 1% to 3%.

Moreover, the compositions herein can contain, in addition to ingredients already mentioned, various other optional ingredients typically used in commercial products to provide aesthetic or additional product performance benefits. Typical ingredients include pH regulants, perfumes, dyes, optical brighteners, soil suspending agents, hydrotropes and gel-control agents, freeze-thaw stabilizers, bactericides, preservatives, suds control agents, bleach stabilizing agents.

In a through-the-wash mode, the compositions are typically used at a concentration of at least 500 ppm, preferably 0.10% to 1.5%, in an aqueous laundry bath at pH 7-11 to launder fabrics. The laundering can be carried out over the range from 5°C to the boil, with excellent results.

Form and Preparation of the compositions - The detergent compositions of the present invention can be in granular, liquid, or sheet-like form. They may be prepared in any way, as appropriate to their physical form, as by mixing the components, co-agglomerating them, micro-encapsulating them, dispersing them in a liquid carrier, releasably adsorbing or coating them onto a non-particulate substrate, such as a non-woven or paper sheet.

Preferably, the compositions are in granular form.

A highly preferred method of preparation of said granular compositions consists in preparing a melt of the dispersing agent and the amide, dispersing the molten mixture into a stirred, aqueous crutcher mix comprising the balance of the deterative ingredients, and spray-drying in standard fashion. In alternate but much less preferred modes, the melt can be atomized onto the detergent granule or allowed to solidify, ground in a colloid mill, and

dry-mixed with the balance of the detergent composition. The compositions herein may also be sprayed onto particles of, e.g., sodium perborate mono or tetrahydrate, sodium sulfate, sodium carbonate, sodium silicate, sodium phosphate, or clay of the type described above.

#### Industrial Application

The following examples are typical of the preferred execution of the invention, but are not intended to limit the scope.

#### EXAMPLE 1

N,N-dimethyl tallowamide (total 6% of complete formulation after spray-drying) and stearic acid (2% of complete formulation) are admixed, melted in a jacketed batch and stirred until homogeneity. A standard aqueous crutcher mix comprising the following ingredients is prepared (percentages listed relate to percent ingredients in the complete formulation after spray-drying).

<u>Ingredients</u>	<u>Percent</u>
C <sub>11</sub> -C <sub>12</sub> alkyl benzene sulfonate	6.2
Tallow alcohol ethoxylate (EO11)	1.0
Sodium tripolyphosphate	24.0
Sodium sulfate	15.0
Sodium silicate	8.0
Smectite clay *	6.5
Carboxymethyl cellulose	0.4
Polyacrylate (soil suspender)	1.7
Enzymes	0.5
Optical brightener	0.23
Sulfonated zinc phthalocyanine **	25 ppm
EDTA	0.2
Perfume/copper salts/minors	0.5
C <sub>12</sub> -C <sub>14</sub> alkyl trimethylammonium chloride	1.9
Moisture	to 77%

The N-N-dimethyl tallowamide/stearic acid melt is poured into the crutcher mix (60-90°C). The crutcher mix-plus-N,N-dimethyl tallowamide/stearic acid is then handled in entirely standard fashion, and spray-dried to form the final composition. After drying sodium perborate, (20%) and bleach activator (3% 3-5-5-trimethyl hexamaic acid, sulfapheryl ester, sodium salt\*\*\*) are dry-mixed with the granules.

\* Natural smectite: ion exchange capacity above 50 meq/100 g clay

\*\* U.S. Patent 3.927.967

\*\*\* U.S. Patents 4.483.778 & 4.539.130.

The composition of Example 1 provided better softness and fabric-care benefits, compared to an identical composition which did not contain the N,N-dimethyl tallowamide/stearic acid premix (reference).

EXAMPLE 2

The same composition as Example 1 was prepared, wherein N,N-dimethyl tallowamide was replaced by N-tallow tallowamide, premixed with stearic acid in the same conditions as in Example 1. Very good results were obtained in softness and fabric-care benefits, compared to the same reference as in Example 1.

EXAMPLES 3 & 4

The following low-phosphate detergent compositions are also prepared.

<u>Ingredients</u>	<u>Percent</u>	
	<u>Ex. 3</u>	<u>Ex. 4</u>
Zeolite A (1-10 microns)	26.0	26.0
Sodium nitrilotriacetate	5.0	5.0
Smectite clay *	3.0	3.0
N,N-dimethyl tallowamide/stearic acid **	5.0	-
N,N-diethanol tallowamide/lauric acid **	-	5.0
C <sub>11</sub> -C <sub>12</sub> alkyl benzene sulfonate	6.5	6.5
Tallow ethoxylate (EO 9-11)	0.5	0.5
Sodium perborate 4H <sub>2</sub> O ***	20	20
Tetraacetyl ethylenediamine (TAED) ***	3	3
Sodium silicate	8	8
CMC	1	1
Sodium sulfate	18	18
Enzymes (1:1 amylase/protease) ***	1.5	1.5
Optical brightener	0.5	0.5
Water, minors	to 100	to 100

\* As Gelwhite GP (TM): CaCO<sub>3</sub> ion exchange capacity  
70 Meq/100 g

\*\* Prepared as in Example 1

\*\*\* Dry-mixed with composition.

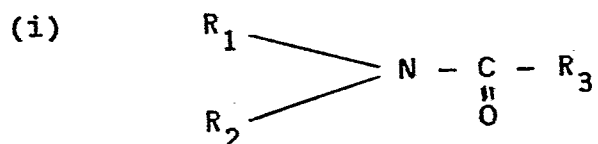
The composition of Examples 3 and 4 are prepared by spray-drying in aqueous crutcher mix, in the manner described for Example 1. The composition of Examples 3 and 4 provide better softness than the composition wherein the amide/fatty acid premixes have been replaced by additional sodium sulfate.



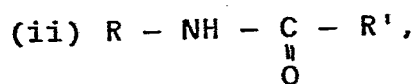
CLAIMS

1. A detergent composition containing surfactants, a nitrogen-containing fabric softener, a bleaching compound and, if desired, deterative additives, characterized in that

- the nitrogen-containing softening agent is an amide having the formula:



wherein  $R_1$  and  $R_2$  are, selected independently,  $C_{1-8}$  alk(en)yl, hydroxy-alkyl,  $R_3$  is hydrogen, or a  $C_{1-22}$  alk(en)yl, aryl or alkyl-aryl group, or is  $O-R_4$ , wherein  $R_4$  is a  $C_{1-22}$  alk(en)yl, aryl or alkyl-aryl group;  $R_3$  and  $R_4$  possibly containing functional groups, selected from hydroxy, ester, ether, amide and amine groups,  $R_1$ ,  $R_2$ ,  $R_3$  each contains from 0 to 10 ethylene oxide units; the aryl groups can possibly be derived from hetero-cyclic compounds; the sum of carbon atoms in  $R_1 + R_2 + R_3$  is equal to or greater than 14; or



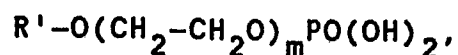
wherein  $R$  and  $R'$  are straight chain alk(en)yl, aryl, or alkyl-aryl groups, each containing from 8 to 22 carbon atoms;

- the bleaching compound is a peroxyacid bleaching agent.

2. A composition in accordance with Claim 1 wherein the amide softening agent is predispersed with a dispersing agent selected from:

- nonionic surfactants resulting from the condensation of primary or secondary aliphatic alcohols;

- phosphate esters having the formula



with  $R'=C_{12}-C_{14}$  and  $m=1-5$ ;

- fatty acids having from 10 to 20 carbon atoms in the alkyl chain.

3. A composition in accordance with Claim 2 wherein the dispersing agent is a fatty acid having from 10 to 20 carbon atoms in the alkyl chain and is present in a weight ratio of amide softening agent to fatty acid of from 1:1 to 10:1.

4. A composition in accordance with Claims 1-3 wherein the peroxyacid bleaching agent is comprised of a peroxygen bleaching compound and an activator therefor.

5. A composition in accordance with Claims 1-4 wherein the amide softening agent is present at levels of from 0.1% to 15% by weight.

6. A composition in accordance with Claims 1-5 wherein the amide softening agent is selected from N-N-dimethyl tallowamide, N-N-dimethyl cocoalkylamide, N-N-diethyl cocoalkylamide, N-N-diethanol tallowamide, N-cocoalkyl stearamide, N-tallow tallowamide.

7. A composition in accordance with any of the preceding claims, which in addition contains a clay softener.



European Patent  
Office

# EUROPEAN SEARCH REPORT

0242918

Application number

EP 87 20 0706

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.4)
A	DE-A-2 250 633 (PROCTER & GAMBLE EUROPEAN TECHNICAL CENTER) * page 13, example 2, claims 1, 3, 4, 7 *	1,4,5	C 11 D 3/00 C 11 D 3/32 D 06 M 13/40
A	--- EP-A-0 155 421 (PROCTER & GAMBLE CO.) * page 9, example 1, claims 1, 4, 5, 10 *	1,4,5,7	
A	--- DE-A-1 959 007 (HENKEL & CIE, GMBH) * claims 1-6 *	1,2,4,5	
D,A	--- EP-A-0 168 889 (PROCTER & GAMBLE CO.) * claims 1, 4, 6, 7 *	1,2,7	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	--- EP-A-0 159 918 (UNILEVER PLC) * page 12, examples, claims 1, 5 *	1	C 11 D 3/00 D 06 M 13/00
A	--- DE-A-2 918 363 (HENKEL KGAA) * claims 1, 4 *	1,2	
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 16-07-1987	Examiner SCHULTZE D
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>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 L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			