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(54) **METHOD FOR TREATING FABRIC HAVING OILY STAINS**

VERFAHREN ZUR BEHANDLUNG VON GEWEBE MIT ÖLIGEN FLECKEN

PROCÉDÉ DE TRAITEMENT DE TISSU AYANT DES TACHES HUILEUSES

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EP 3 224 335 B1

Description

Field of the invention

[0001] The invention relates to a method for removing oily stains from fabrics.

Background of the invention

[0002] Known methods for removing stains from fabrics may be classified into 1-step and 2-step method. A typical two-step method usually involves successive treatment of the stained fabric with two separate components. In a first step, the stained fabric is contacted with a first component which generally is a stain-removing pretreatment composition. In the second step the pretreated fabric is washed with a laundry detergent composition.

[0003] Different types of stain removing compositions are known. Such compositions are efficacious against a particular stain or a class of stains. It is generally observed that oily stains are more difficult to remove from fabrics.

[0004] WO2013092184 A1 (Unilever) discloses a method for treating soiled fabrics to make it more susceptible to be cleaned in the subsequent wash cycle, in particular making the fabric more hydrophilic, and thereby enhancing oily stain removal. The fabric treatment composition has a metal salt like polyaluminium chloride and a carboxylic polymer, an organic acid and a polysaccharide.

[0005] Stain removal has been an important objective of the detergent industry because if there is a method which can remove significant amount of stain, then this may allow for sustainable and more responsible use of detergent products or may even allow detergent compositions to be made usable and effective at lower temperature and thereby save substantial energy. Therefore there is still a continued interest in ways and means to aid and improve detergency, especially against oily stains like dirty motor oil on hydrophilic fabrics.

[0006] GB338121 (Marquardt and Walter, 1930) discloses a 2-step method of cleaning soiled fabrics in which the first component has saponifiable fatty acids such as oleic acid, palmitic acid, or stearic acid and the second component has alkaline saponifying agents such as sodium carbonate, sodium bicarbonate or sodium hydroxide.

[0007] A shear-thinning gel detergent composition is disclosed in US20040058838A1 (Unilever). The composition contains non-neutralized fatty acid in specific amounts depending on the total surfactant level. This product offers dual advantages of pre-treatment and mainwash detergency in the form of a single product. A laundry pre-treatment composition having at least 55 wt% fatty acid with melting point greater than 20 °C, a polyhydric alcohol binder, water and surfactant is disclosed in WO2010023043 A1 (Unilever).

DE2338411 A1 (Henkel, 1975) discloses a method for cleaning textiles for removing fatty soil. In a first step, the fabric is washed at 25 to 80 degC for 2 to 30 minutes with an emulsion containing fatty acids, followed by addition of an electrolyte. The third step is washing with a detergent composition.

As described earlier, it has been difficult to remove oily stains, especially stained hydrophilic fabrics like cotton and polycotton. Therefore even with the best pre-treatment product available, the fabrics still need to be washed with conventional detergents for maximum stain removal.

We have determined a method in which pre-treatment of the stained fabric in the manner hereinafter disclosed, allows, in the second stage, a consumer to use milder washing conditions, such as washing at room temperature.

Summary of the invention

[0008] In accordance with a first aspect is disclosed a method of cleaning fabrics having oily stains thereon, the method includes a first step of applying one or more fatty acids to a stained portion of the fabric in which step there is no contact of said stained portion with any surfactant other than monoglycerides, and a second step of washing the stained portion in wash liquor having a detergent composition, characterised in that in the first step, a monoglyceride is applied to the stained portion simultaneously with the one or more fatty acids wherein the composition comprises a mixture of fatty acids containing 60 wt% to 90 wt% oleic acid, the balance being either stearic or palmitic acid or a combination thereof. When the method is followed, significantly lesser amount of oily stain is left behind, especially on hydrophilic fabrics.

The invention will now be explained in details.

Detailed description of the invention

[0009] The method is a 2-step method. The first step involves applying one or more fatty acids to a stained portion of the fabric. In this step there is no contact of the stained portion with any surfactant. In the second step the stained portion is washed in wash liquor which has a detergent composition. The characterising feature is that in the first step a monoglyceride is applied to the stained portion simultaneously with the fatty acids.

[0010] The term surfactant means any surfactant other than monoglycerides.

The fabric

[0011] The fabric (also referred to as textile/cloth) may be any typical fabric such as cotton (woven, knitted and denim), polyester (woven, knitted and micro fibre), nylon, silk, polycotton (polyester/cotton blends), polyester elastane, cotton elastane, viscose rayon, acrylic or wool. The method is particularly suitable for hydrophilic fabrics and more particularly to cotton or polycotton. Therefore it is preferred that the hydrophilic fabric is cotton or polycotton.
Other fabrics that can be treated include other synthetic as well as natural fabrics. It is envisaged that the method can be used to treat garments and other clothing and apparels that form typical wash-load in household laundry. The household materials that can be treated include, but are not limited to, bedspreads, blankets, carpets, curtains and upholstery.

The stain

[0012] The stain may be any oily stain. Accordingly, in a preferred embodiment of the method, the stained portion of the fabric substantially contains oily or fatty stains. They are predominately solid in nature and such stains come into contact with fabrics in the course of their regular use. In a preferred embodiment, the stained portion of the fabric substantially contains oily or fatty stains. Non-limiting examples include tomato oil stain, curry oil stain and sebum derived stains as well as dirty motor oil stain.

The fatty acid

[0013] As disclosed earlier, the method is a 2-step method. The first step involves applying fatty acids to a stained portion of the fabric. In this step there is no contact of the stained portion with any surfactant other than monoglycerides.
[0014] The fatty acid is in the acidic form, i.e., in the non-neutralised form. The composition comprises a mixture of fatty acids containing 60 wt% to 90 wt% oleic acid, the balance being either stearic or palmitic acid or a combination thereof.

The monoglyceride (also known as monoesters of glycerol and fatty acid)

[0015] The characteristic feature of the invention is that in the first step a monoglyceride is applied to the stained portion simultaneously with the one or more fatty acids.
[0016] Particularly suitable are those monoglycerides which are at least to some extent water dispersible. Preferred materials include monoglycerides of glycerol and aliphatic fatty acids have a carbon chain containing 12 to 20 carbon atoms. Examples of such monoglycerides include glyceryl monolaurate, glyceryl monomyristate, glyceryl monopalmitate and glyceryl mono stearate.
In a particularly preferred embodiment the ratio of total monoglyceride content to the total fatty acid content applied to the stained portion is in the range of 2:98 to 60:40 parts by weight. It is also particularly preferred that the monoglyceride is applied to the stained portion simultaneously with the one or more fatty acids.
A particularly preferred monoglyceride is glyceryl mono stearate. This material is preferred due to good performance, easy availability, degree of water dispersibility and suitable melting point. Glyceryl monostearate is also available as a non-emulsifying or a self-emulsifying material.
[0017] The monoglyceride is applied to the stained portion simultaneously with the one or more fatty acids.
[0018] The stained portion is treated with a pretreatment composition which includes the one or more fatty acids and the monoglyceride. It is believed that the mixture of monoglycerides and fatty acids leads to better packing at interface and hence lowering of oil-water IFT. In the case of pretreatment composition, the composition preferably has 10 to 60 wt% monoglyceride and the balance being one or more fatty acids. It is preferred that the composition has 30 to 70 wt% oleic acid and 4 to 10 wt% each of stearic and palmitic acid.
The fatty acids can be applied to a stained portion of the fabric by any known means. Similarly, the monoglyceride can also be applied by any known means which may or may not be the same as that employed for application of the fatty acid(s). It is preferable, in view of convenience, that the fatty acid(s) and the monoglyceride, are applied through a stain removing device such as a stain removing pen.
The device may also be a roll-on applicator or tube, spray, aerosol or pump-operated dispenser. The device may further have a scrubbing member having brush, bristles, tufts, projections, embossments or any combination thereof to further aid application of the fatty acid(s) and/or the monoglyceride.

The second step

[0019] In the second step the stained portion is washed in wash liquor which has a detergent composition.
[0020] The second step may be termed as a 'main' wash and may be manual or machine wash process. Any suitable detergent composition can be used. It is preferred that this detergent composition has a first anionic surfactant which is

linear alkyl benzene sulphonate and at least one more anionic surfactant which is a primary alcohol sulphate (PAS), an alkyl ester sulphonate (MES) or an alkoxylated sulphate (SLES).

[0021] In a preferred embodiment the concentration of the detergent composition in the wash liquor is from 1 to 3 g/litre. Preferably the pH of the wash liquor at 25 °C is 6.5 to 10.5.

[0022] It is preferred that the anionic surfactant content of the detergent composition is 5 to 60 wt%, more preferably from 10 to 50 wt%.

[0023] Other anionic surfactants may be chosen from the surfactants described in 'Surface Active Agents' Vol. 1, by Schwartz and Perry, Interscience 1949, Vol. 2 by Schwartz, Perry and Berch, Interscience 1958, in the current edition of McCutcheon's Emulsifiers and Detergents published by Manufacturing Confectioners Company or in Tenside-Taschenbuch, H. Stache, 2nd Edn., Carl Hauser Verlag, 1981.

Nonionic surfactant

[0024] Preferred embodiments of the detergent composition also contain nonionic surfactants which are further discussed below. Highly preferred are fatty acid alkoxylates, especially ethoxylates, having an alkyl chain of from C_8-C_{35}, preferably C_8-C_{30}, more preferably C_{10}-C_{20}, especially C_{10}-C_{18} carbon atoms, for example, the Neodol® range from Shell (The Hague, The Netherlands); ethylene oxide/propylene oxide block polymers which may have molecular weight from 1,000 to 30,000, for example, Pluronic® from BASF (Ludwigshafen, Germany); and alkylphenol ethoxylates, for example Triton® X-100, available from Dow Chemical (Midland, Mich., USA).

[0025] More preferred nonionic surfactants are the ethoxylates with an average degree of ethoxylation of seven, alkoxylates with one propylene oxide and multiple ethylene oxide units, seed oil based surfactant, such as Ecosurf® SA7 or SA9 available from Dow Chemicals.

[0026] In accordance with further preferred embodiment of the method, [in step 2] the detergent composition has 10 to 40 wt% sodium carbonate. Still more preferably the detergent composition has 20 to 50 wt% sodium sulphate.

Other optional Ingredients

[0027] In addition, the detergent composition may include one or more optional ingredients to enhance performance and properties. While it is not necessary for these elements to be present, the use of such materials is often very helpful in rendering the formulation acceptable for consumer use. Examples of optional components include, but are not limited to: hydrotropes, fluorescent whitening agents, photobleaches, fibre lubricants, reducing agents, enzymes, enzyme stabilising agents (such as polyols), powder finishing agents, defoamers, bleaches, bleach catalysts, soil release agents, especially soil release polymers for cotton or polyester or both, antiredeposition agents, especially antiredeposition polymers, dye transfer inhibitors, buffers, colorants, fragrances, pro-fragrances, rheology modifiers, anti-ashing polymers, preservatives, insect repellents, soil repellents, water-resistance agents, suspending agents, aesthetic agents, structuring agents, sanitisers, solvents, including aqueous and non-aqueous solvents, fabric finishing agents, dye fixatives, wrinkle-reducing agents, fabric conditioning agents and deodorizers.

[0028] The detergent composition may be of low to moderate bulk density. In that case it may be prepared by spray-drying slurry, and optionally post dosing (dry-mixing) further ingredients. Routes available for powder manufacture include spray drying, drum drying, fluid bed drying, and scraped film drying devices such as the wiped film evaporator.

[0029] Alternatively, the main wash powder may be a concentrated or compact powder. Such powders may be prepared by mixing and granulating processes, for example, using a high-speed mixer/granulator, or other non-tower processes.

[0030] The invention will now be further described with reference to the following non-limiting examples.

Examples

Example 1:

[0031]

Table 1: Mixture of fatty acids for step 1

Ingredient	wt%
Glycerol mono stearate	2.7
Oleic Acid	80.0
Stearic Acid	9.3

(continued)

Ingredient	wt%
Palmitic Acid	8.0

Table 2: Detergent powders for step 2

Ingredients/wt%	Composition number			
	1	2	3	4
Linear alkyl benzene sulphonate, Na salt	18.0	10.0	18.0	10.0
SLES 3EO	-	10.0	-	10.0
Lauryl alcohol 7EO	2.0	-	2.0	-
Sodium chloride	60.0	60.0	-	-
Sodium carbonate	-	-	20.0	20.0
Sodium sulphate	-	-	40.0	40.0
Water	20.0	20.0	20.0	20.0

Process for preparation of samples and for staining the test swatches

[0032] Glyceryl monostearate and the mixture of fatty acids (quantities shown in table 1) were taken in a glass container and were allowed to melt by gentle heating. They were thereafter mixed thoroughly at ~55 °C to get a well-mixed composition for step 1.

[0033] The composition was cooled to 25 °C and then applied onto test fabric swatches, previously stained with known quantity of sunflower oil as dummy oily stains.

[0034] One ml of the mixture of table 1 was applied on stained portion of each swatch. Thereafter the swatches were washed in wash liquor containing the detergent composition of table 2. After thoroughly rinsing each swatch, the swatches were air dried and further used for oil removal study.

[0035] The extent of oil removal was estimated by extracting the quantity of oil left behind on each fabric swatch and comparing it with the initial quantity. Infra-red spectroscopy (at 2946 cm^{-}) was used for this analysis. The peak area and peak height were analyzed with respect to the calibration plot of the same oil at 2946 cm^{-1}.

[0036] Important conditions are summarised in table 3.

Table 3

Machine	Tergo-to-meter®
RPM	-90
Temperature	25 °C
Liquor to cloth ratio	40
Fabric type	Cotton:10cmX10cm
Wash liquor	1.5 g/litre detergent composition
Instrument	FOSS® Soxtec system ht M6
Solvent	Carbon tetrachloride
Temperature	160 °C

[0037] The results of this experiment are summarised in table 4.

Table 4

Swatches washed with	Oil remaining on the swatches (as % of initial quantity)
Mixture of Table 1 + plain water wash	47
Mixture of Table 1 + Composition 1 of Table 2	37
Mixture of Table 1 + Composition 2 of Table 2	22
Mixture of Table 1 + Composition 3 of Table 2	27
Mixture of Table 1 + Composition 4 of Table 2	13

[0038] Interpretation of the data shown in table 4 clearly indicates that more and more oil was removed from the test swatches with the changes to the detergent compositions..

[0039] Swatches which were not washed with a detergent showed only about 50% oil removal. Difference between the second and the third data point indicates the effect of the second anionic surfactant which is alkoxylated sulphate (SLES). Data points 4 and 5 number show the additional beneficial effects of having soda and sodium sulphate. Composition 4 shows the best results.

Example 2:

[0040] One more set of experiments was performed to study the effect of varying monoglyceride content in a pretreatment composition having the fatty acids and the monoglyceride. In order to minimize the effects of other factors, all experiments were conducted with the Composition 2 of Table 2.

Table 5: Pre-treatment compositions for step 1

Ingredients/wt%	Pretreatment composition	
	A	B
Glycerol monostearate	20	50
Oleic Acid	64	40
Stearic Acid	8	5
Palmitic Acid	8	5

[0041] Note: the fatty acid levels , considering the total amount of fatty acids is as follows: In composition A: Oleic 80%, stearic 10% , palmitic 10%
In composition B: Oleic 80%, stearic 5% , palmitic 5%

[0042] A summary of the results is presented in table 6.

Table 6

Swatches washed with	Oil remaining on the swatches (as % of initial quantity)
Only with the detergent	37
With Composition A and detergent	28
With composition B and detergent	22

[0043] The data in table 6 clearly shows the efficacy of pretreatment compositions against oily stains.

Claims

1. A method of cleaning fabrics having oily stains thereon, said method comprising a first step of applying one or more fatty acids to a stained portion of said fabric in which step there is no contact of said stained portion with any surfactant other than monoglyceride, and a second step of washing said stained portion in wash liquor comprising a detergent composition, **characterised in that** in said first step, a monoglyceride is applied to said stained portion simultaneously

with said one or more fatty acids wherein said stained portion is treated with a pretreatment composition containing said one or more fatty acids and said monoglyceride and wherein said composition comprises a mixture of fatty acids containing 60 wt% to 90 wt% oleic acid, the balance being either stearic or palmitic acid or a combination thereof.

2. A method as claimed in claim 1 wherein ratio of total monoglyceride content to the total fatty acid content applied to said stained portion is in the range of 2:98 to 60:40 parts by weight.

3. A method as claimed in any one of the preceding claims 1 to 2 wherein said monoglyceride is glyceryl mono stearate.

4. A method as claimed in any one of the preceding claims 1 to 3 wherein said detergent composition comprises a first anionic surfactant which is linear alkyl benzene sulphonate and at least one more anionic surfactant which is a primary alcohol sulphate (PAS), an alkyl ester sulphonate (MES) or an alkoxylated sulphate (SLES).

5. A method as claimed in any one of the preceding claims 1 to 4 wherein said detergent composition comprises 10 to 40 wt% sodium carbonate.

6. A method as claimed in claim 5 wherein said detergent composition comprises 20 to 50 wt% sodium sulphate.

7. A method as claimed in any one of the preceding claims 1 to 6 wherein concentration of said detergent composition in said wash liquor is from 1 to 3 g/litre.

8. A method as claimed in any one of the preceding claims 1 to 7 wherein said fabric is hydrophilic.

9. A method as claimed in claim 8 wherein said hydrophilic fabric is cotton or polycotton.

10. A method as claimed in any one of the preceding claims 1 to 9 wherein said stained portion of the fabric contains oily or fatty stains.

11. A method as claimed in claim 10 wherein pH of 1 % solution of said detergent composition at 25 °C is 6.5 to 10.5.

Patentansprüche

1. Verfahren zum Reinigen von textilen Erzeugnissen mit sich darauf befindlichen öligen Flecken, wobei das Verfahren umfasst: einen ersten Schritt des Auftragens von einer oder mehreren Fettsäuren auf einen befleckten Teil des textilen Erzeugnisses, wobei bei diesem Schritt kein Kontakt des befleckten Teils mit irgendeinem Tensid, das von Monoglycerid verschieden ist, besteht, und einen zweiten Schritt des Waschens des befleckten Teils in einer Waschlauge, die eine Reinigungsmittelzusammensetzung umfasst, **dadurch gekennzeichnet, dass** in dem ersten Schritt ein Monoglycerid gleichzeitig mit einer oder den mehreren Fettsäuren auf den befleckten Teil aufgetragen wird, wobei der befleckte Teil mit einer Vorbehandlungszusammensetzung behandelt wird, die die eine oder die mehreren Fettsäuren und das Monoglycerid enthält, und wobei die Zusammensetzung eine Mischung von Fettsäuren umfasst, die 60 Gew.-% bis 90 Gew.-% Ölsäure enthält, wobei der Rest entweder Stearin- oder Palmitinsäure oder eine Kombination davon ist.

2. Verfahren, wie im Anspruch 1 beansprucht, wobei das Verhältnis des gesamten Monoglycerid-Gehalts zu dem gesamten Fettsäure-Gehalt, aufgetragen auf den befleckten Teil, in dem Bereich von 2:98 bis 60:40 Gewichtsteilen liegt.

3. Verfahren, wie in irgendeinem der vorhergehenden Ansprüche 1 bis 2 beansprucht, wobei das Monoglycerid Glycerylmonostearat ist.

4. Verfahren, wie in irgendeinem der vorhergehenden Ansprüche 1 bis 3 beansprucht, wobei die Reinigungsmittelzusammensetzung ein erstes anionisches Tensid, welches lineares Alkylbenzolsulfonat darstellt, und mindestens ein weiteres anionisches Tensid, welches ein primäres Alkoholsulfat (PAS), ein Alkylestersulfonat (MES) oder ein alkoxyliertes Sulfat (SLES) darstellt, umfasst.

5. Verfahren, wie in irgendeinem der vorhergehenden Ansprüche 1 bis 4 beansprucht, wobei die Reinigungsmittelzusammensetzung 10 bis 40 Gew.-% Natriumcarbonat enthält.

6. Verfahren, wie im Anspruch 5 beansprucht, wobei die Reinigungsmittelzusammensetzung 20 bis 50 Gew.-% Natriumsulfat umfasst.

7. Verfahren, wie in irgendeinem der vorhergehenden Ansprüche 1 bis 6 beansprucht, wobei die Konzentration der Reinigungsmittelzusammensetzung in der Waschlauge von 1 bis 3 g/Liter beträgt.

8. Verfahren, wie in irgendeinem der vorhergehenden Ansprüche 1 bis 7 beansprucht, wobei das textile Erzeugnis hydrophil ist.

9. Verfahren, wie im Anspruch 8 beansprucht, wobei das hydrophile textile Erzeugnis Baumwolle oder Polycotton ist.

10. Verfahren, wie in irgendeinem der vorhergehenden Ansprüche 1 bis 9 beansprucht, wobei der befleckte Teil des textilen Erzeugnisses ölige oder fettige Flecken enthält.

11. Verfahren, wie im Anspruch 10 beansprucht, wobei der pH einer 1%-igen Lösung der Reinigungsmittelzusammensetzung bei 25°C 6,5 bis 10,5 beträgt.

Revendications

1. Procédé de nettoyage de tissus ayant sur eux des taches huileuses, ledit procédé comprenant une première étape d'application d'un ou plusieurs acides gras à une partie tachée dudit tissu étape dans laquelle il n'y a pas de contact de ladite partie tachée avec un quelconque tensioactif autre qu'un monoglycéride, et une seconde étape de lavage de ladite partie tachée dans un liquide de lavage comprenant une composition détergente, **caractérisé en ce que** dans ladite première étape, un monoglycéride est appliqué à ladite partie tachée en même temps que lesdits un ou plusieurs acides gras où ladite partie tachée est traitée avec une composition de prétraitement contenant lesdits un ou plusieurs acides gras et ledit monoglycéride et où ladite composition comprend un mélange d'acides gras contenant 60 % en poids à 90 % en poids d'acide oléique, le complément étant de l'acide stéarique ou de l'acide palmitique ou une combinaison de ceux-ci.

2. Procédé selon la revendication 1 où le rapport de la teneur en monoglycéride totale à la teneur en acides gras totale appliqué à ladite partie tachée est dans la plage de 2:98 à 60:40 parties en poids.

3. Procédé selon l'une quelconque des revendications 1 à 2 précédentes où ledit monoglycéride est le monostéarate de glycéryle.

4. Procédé selon l'une quelconque des revendications 1 à 3 précédentes où ladite composition détergente comprend un premier tensioactif anionique qui est un alkylbenzènesulfonate linéaire et au moins un tensioactif plus anionique qui est un sulfate d'alcool primaire (PAS), un alkylester sulfonate (MES) ou un sulfate alcoxylé (SLES).

5. Procédé selon l'une quelconque des revendications 1 à 4 précédentes où ladite composition détergente comprend 10 à 40 % en poids de carbonate de sodium.

6. Procédé selon la revendication 5 où ladite composition détergente comprend 20 à 50 % en poids de sulfate de sodium.

7. Procédé selon l'une quelconque des revendications 1 à 6 précédentes où la concentration de ladite composition détergente dans ledit liquide de lavage est de 1 à 3 g/litre.

8. Procédé selon l'une quelconque des revendications 1 à 7 précédentes où ledit tissu est hydrophile.

9. Procédé selon la revendication 8 où ledit tissu hydrophile est du coton ou du polycoton.

10. Procédé selon l'une quelconque des revendications 1 à 9 précédentes où ladite partie tachée du tissu contient des taches huileuses ou grasses.

11. Procédé selon la revendication 10 où le pH d'une solution à 1 % de ladite composition détergente à 25°C est 6,5 à 10,5.

REFERENCES CITED IN THE DESCRIPTION

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