



(51) International Patent Classification:

C11D 3/40 (2006.01) C11D 3/37 (2006.01)

(21) International Application Number:

PCT/TR2016/050146

(22) International Filing Date:

18 May 2016 (18.05.2016)

(25) Filing Language:

English

(26) Publication Language:

English

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: DUAL PURPOSE CLEANING COMPOSITION FOR LIMESCALE REMOVAL

(57) Abstract: The present invention provides a dual purpose liquid acidic cleaning composition for hard surfaces indicating the completeness of cleaning process via colorimetric change which occurs upon interaction of colorimetric dye with ions responsible for limescale formation.



DUAL PURPOSE CLEANING COMPOSITION FOR LIMESCALE REMOVAL

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FIELD OF THE INVENTION

The field of the present invention relates to cleaning compositions.

The field of the present invention relates to hard surface cleaning compositions.

The field of present invention relates to liquid acidic hard surface cleaning compositions.

- 5 The field of the present invention relates to monitoring of cleaning of hard surfaces.

The field of the present invention relates to the use of a colorimetric dye in hard surface cleaning compositions for colorimetric marker.

- 10 Particularly this application relates to the specific compositions in order to fulfill all the said requirements and the needs in this particular field.

To the present invention related compositions is superior thus appealing customer more due to having colorimetric marker for the implementation of hard surface cleaning.

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BACKGROUND OF THE INVENTION

- Consumer perception and habits determine the trends in consumer products. Consumers have been looking for novel and interesting cues to inform them about the cleaning process in order to be
- 20 convinced about the effectiveness, performance and reliability of the cleaning. Consumers have demanded to choose a detergent composition according to the cleaning capability of the product. Additionally, consumers have judged the cleaning capability of a detergent composition according to the cues that they receive during the cleaning process. The amount of generated foam, the duration of it, the breeze of a perfume and the presence of suds in detergents are some of the marks that
- 25 consumers have faith in that the product is working effectively and sustaining its cleaning performance. Therewithal, consumers dose the detergent according to those cues. All these mentioned cues are just for the management of consumer perceptions since the end results like removal of soil from surface, shiner dishes or whiter fabrics are the real signs that manufacturers rely on. As a matter of the fact that it is important to produce an empowered detergent composition with
- 30 a real sign for cleaning process to reassure the consumer according to the way of usage. This can be achieved by the evolving of a new cleaning composition implementing a colorimetric change during cleaning process because beside above mentioned cues, color change offers a chemical basis and real indication of cleaning effectiveness. Furthermore, a visual indication like colorimetric change can be

used to convince the consumer about the occurrence of cleaning that they may not be aware. Thus in turn, consumer perceptions can be managed accordingly.

5 In the cleaning of hard surfaces, it has been always a challenge to reach the complete cleaning due to the presence of ions which are responsible for water hardness. Tap water contains solubilized ions causing water hardness which leads to the deposition of salts of calcium carbonate on surfaces with the consequent formation of watermarks upon water evaporation. When surfaces contact with water, these salt deposits lead to the inesthetic aspect of the surfaces like reduced shine with improved dinginess. Thereto, the deposited limescale is more or less colorless and as a result, the
10 detection and recognition of these salts by eye becomes difficult. Hence, this limescale formation becomes more severe in places where the hardness of the tap water is high which makes cleaning process even more compelling.

It is an object of the present invention is to provide a liquid composition having ability to remove
15 limescale deposits on the surface. Additionally, it is a further object of the present invention is to provide a liquid cleaning composition which simplifies the hard surface descaling process for consumers.

During the cleaning of hard surfaces, it is difficult but important to determine whether the deposited
20 area is covered with the composition or not in order to assist the attainment of complete cleaning. Because of that the use of a colored composition is influential and reliable since visually identifying coverage makes easy to track whether the area is covered with the composition or not. Consumers dose the detergent amount enough for cleaning process in a way as to cover the target area. By this way, complete and effective cleaning is achieved with small amount of cleaning composition which
25 decreases the cost of the process. As associated therewith, the rinsing of the composition requires less water which is a critical parameter in places where the water shortages is high and this is also important in terms of cost saving and environmental care. Furthermore, the use of colored composition is crucial since consumer can visually observe the deposited area; they can apply enough force to clean, scrub or wipe to implement the cleaning which reduces the application of
30 excessive force. Hence, cleaning process becomes simple and straightforward instead of being laborious and exhausting.

It is thus an object of the present invention is to provide a liquid composition having ability to remove limescale deposits existing on the surface which indicates to the consumer whether the

desired area of the surface has been covered with the composition or not in order to assist the attainment of complete cleaning.

Furthermore, in addition to the use of colored cleaning composition, another way to prevent the incomplete cleaning is the use of a cleaning composition involving an organic dye compound which indicates the completion of the cleaning process by colorimetric change upon interaction with the solubilized metal ions responsible for water hardness. This organic dye is an indicator compound which represents an observable color change to indicate the limescale impurities when coming into contact with the ions responsible for water hardness. Colorimetric changes have gained the admiration of consumers since color change indicates that the sufficient and effective cleaning has been performed and also it indicates that the removal of limescale is completed. This indication leads to easy, safe, effective and inexpensive cleaning with improved consumer reliance. Beside, cleaning composition having indication for the complete cleaning process has gained the trust and faith of consumer which starts to feel safe during the usage and thus in turn, the use of this product turns into an indispensable habit. Additionally, the present invention offers a visual indication of the completeness of cleaning process without the need of using two different dye systems. Dye combination systems which sometimes involving a fluorescer are used for the improved visibility of the color change and an improved aspect of the cleaning composition before its use. However, the color of the indicator dye can be altered by the addition of a dye having a different color that may lead to the inesthetic appearance of the process and thus, may lead to misinterpretations by the consumer.

Therefore, there exists a growing need and demand for liquid cleaning composition having the ability to remove deposited limescale on substrates, to assist the attainment of complete cleaning process by indicating whether the target area is covered or not and to indicate the completion of the cleaning process by changing color.

Additionally, there exists a need for a liquid hard surface cleaning composition indicating the completeness of cleaning process by using a single dye system for preventing alteration of color of indicator dye and inesthetic appearance of the cleaning process, thus avoid misinterpretations of the consumer.

It is thus another object of the present invention is to provide a liquid cleaning composition giving an indication of the completion of limescale removal via colorimetric change which facilitates easy, safe, effective and inexpensive cleaning.

It is thus another object of the present invention is to provide a liquid cleaning composition comprising single dye system to prevent alteration of color of the indicator dye, inesthetic appearance of the cleaning process and thus, misinterpretations of the consumer.

5 Hard surface cleaners like bathroom or kitchen cleaners known for many years have alkaline pH and they offer effective cleaning for removing most stains and especially the fatty soils. However, they are moderately effective to remove limescale deposits since limescale removal can be achieved by a chemical reaction in acidic media. Additionally, the formation of water marks and limescale deposits on hard surfaces can be reduced when surfaces treated with liquid acidic compositions. Although
10 several liquid acidic hard surface cleaners have been known in the art, none of them has the ability to assist the attainment of completeness of cleaning process by indicating whether the target area is covered or not and to indicate the completion of the cleaning process by changing color.

Thus, there exists a need and demand for a hard surface acidic liquid cleaning composition which has the ability both to show whether the target area is covered with the composition and to indicate the
15 completeness of cleaning process by a colorimetric change upon interaction with ions responsible for limescale formation.

It is thus an object of the present invention is to provide an acidic liquid cleaning composition indicating the completion of limescale removal process via colorimetric change offers effective
20 removal of limescale deposits with its acidic nature.

Color changing systems for liquid acidic hard surface cleaners are known from EP255978. This invention is comprised of an aqueous solution of a strong acid, a detergent-active compound and a dye in which detergent active compound is in a cationic form in the composition and the dye
25 undergoes a color change upon changes in pH. This invention involves the use of a dye which is a pH indicator and thus, color change occurs as a result of the changes in pH. The color change in accordance with the change in pH is just a visual cue about the chemical environment of the system. Whereas the colorimetric change in the present invention is a visual proof of limescale removal as a result of the interaction of dye with ions responsible for water hardness. Thus, the cleaning
30 composition of present invention offers a color change which is a visual proof of limescale removal.

Color changing systems for hard surface cleaners are known also from EP 1828364 which is about a metal complexing dye in an uncomplexed form, surfactant for enhanced sud removal and the use of fluorescer which is also a dye. The color change is observed upon dilution of the cleaner with water
35 in order to mask the reddish brown water color which is perceived as "dirty and unfit for the use"

after items are washed or rinsed. This invention indicates to users of the composition that the water is clean by masking the color of the suds and consumers are brought about to make a decision to wash or rinse the items. This masking can be interpreted wrong and consumers may continue to use the cleaning water although it becomes dirty. Additionally, this cleaner composition is transparent and does not indicate the coating of target area and thus, this composition does not serve any aim to assist the consumers about their cleaning process whether it is reached completeness or not. Besides, the cleaning of hard surfaces is aimed to be achieved with alkaline liquid composition which is moderately feasible for removal of limescale deposits which requires chemical reaction with acidic media. On the other hand, the present invention offers a real clue about the cleaning process by using metal complexing dye for the visual information about limescale removal by using acidic media which is essential for effective removal of deposits via a chemical reaction.

It has been a challenge to prepare a hard surface acidic liquid cleaning composition which offers limescale removal therewithal by indicating whether the target area is coated with cleaning composition and by indicating the completion of the cleaning process via change in the color of composition.

The present invention overcomes above mentioned problems by formulating a color changing acidic liquid cleaning composition having ability not only to remove limescale deposits existing on the surface but also to assist the completion of the cleaning both by indicating whether the target area is covered or not and by indicating the completion of the cleaning process by change in color that allows the consumer to maintain using the product to its full extent by facilitating an easy, effective, safe and inexpensive cleaning.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1. Absorbance spectrum belongs to colorimetric Alizarin Red S dye in the absence (dashed lines) and presence (solid line) of calcium cations responsible mainly for water hardness.

DISCLOSURE OF THE INVENTION

The present invention relates to a hard surface acidic liquid cleaning product which is superior to commercially available products on the market with regard to completion of hard surface cleaning process.

- 5 The present invention relates to colored acidic liquid hard surface cleaning product for limescale removal residue on the surfaces assisting the cleaning process by indicating whether target area is covered with the composition or not.

10 The present invention relates to colored acidic liquid hard surface cleaning product for limescale removal present on the surfaces indicating the completion of the cleaning process via a change in the color of the composition.

The present invention relates to colored acidic liquid hard surface cleaning product having above mentioned features allowing the consumer to maintain using the product to its full extent by facilitating an easy, effective, safe and inexpensive cleaning.

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It is thus an object of the present invention is to provide a colored liquid cleaning composition which can display the coating of target area with the color of composition and the removal of lime scale via a change in the color of composition wherein the composition comprises:

- 20 a. an acid stable polymer
b. colorimetric single dye system

The term "liquid" is used to refer to gel, sprayable, pourable, rinsable solutions and mixtures thereof. The term liquid cleaning composition is used to refer to spraying, pouring, rinsing type cleaning which requires the employment of physical force like scrubbing, wiping, scouring and brushing. The terms are used interchangeably.

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Liquid cleaning composition and/or liquid cleaning product and/or Liquid detergent composition cover the cleaning products for hard surfaces. The term "hard surface" is used to refer to any kind of surfaces existing in living areas like bathrooms, kitchens covering floors, walls, sinks, showers, dishes, toilets, wash basins that are prepared by different type of materials like wood, plastic, ceramic, glass, melamine, etc. Additionally, the terms cleaning product and/or cleaning composition and/or detergent composition are used interchangeably.

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The colorimetric dye is an organic compound which represents a color change upon interaction with ions responsible for water hardness which are deposited on hard surfaces. The liquid acidic cleaning

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composition of the present invention comprises a colorimetric dye preferably from 0.001 wt.-% to 0.010 wt.-%, more preferably 0.002wt.-% to 0.008wt.-%, most preferably 0.003 wt.-% to 0.006wt.-% of the total composition.

- 5 The colorimetric dye has an aromatic and/or heterocyclic hydrocarbon ring which bears metal ion complexation groups.

The said metal ions responsible for water hardness are deposited on the hard surfaces as their salts and cationic group of these salts are the second group metals of periodic table, preferably Ca^{2+} and
10 Mg^{2+} , most preferably the Ca^{2+} ions.

The hard surface acidic liquid cleaning composition of the present invention comprises polycarboxylate polymer, a sulphonated polystyrene polymer, homopolymer or copolymer of a vinylpyrrolidone or mixtures thereof in order to improve the hydrophilicity of the surface inhibit scale
15 formation and thus provide ease of cleaning with reduced cleaning time. The acid stable polymer has the ability to bind calcium ions, making them water soluble which enhances the cleaning performance of the composition. The liquid acidic cleaning composition of the present invention comprises the maleic/acrylic acid copolymers, maleic acid/olefin copolymers, vinylpyrrolidone/dimethylaminoethylmethacrylate copolymer or mixture thereof from 0.1 wt.-% to 5.0 wt.%,
20 preferably from 0.5wt.-% to 4.0 wt.-% and more preferably from 1.0 wt.- to 3.0 wt.-% of the total composition.

The pH of the composition is adjusted between 1.0 and 7.0, preferably in between 2.0 and 5.0. The pH of the composition can be adjusted by using pH modifiers which are chosen as close analogy to
25 the literature.

COLORIMETRIC SINGLE DYE SYSTEM

30 The colorimetric dye is an organic compound which represents a color change upon interaction with ions responsible for water hardness which are deposited on hard surfaces.

The hard surface acidic liquid cleaning composition of the present invention comprises a colorimetric dye preferably from 0.001 wt.-% to 0.010 wt.-%, more preferably 0.002wt.-% to 0.008wt.-%, most preferably 0.003 wt.-% to 0.006wt.-% of the total composition.

- 5 The colorimetric dye has an aromatic and/or heterocyclic hydrocarbon ring which bears metal ion complexation groups.

The suitable colorimetric dyes of the present application can be selected polyvalent metal cation capturing complexation agents like metalphthalein, 3,4-dihydroxy-9,10-diazo-2-anthracene sulfonic acid (Alizarin Red S), ammonium purpurate, 1- (1- hydroxy-2-naphthylazo)-5-nitro-2-naphthol-4-sulfonic acid (Eriochrome Black T) and 1- (1-hydroxy-4-methyl-2- phenylazo)-2-naphthol-4-sulfonic acid (Calmagite), whereas Alizarin Red S is preferred colorimetric dye of the present application.

15 The preferred colorimetric dye Alizarin Red S has an absorption maximum around 425 nm in the absence of calcium cations and absorption maximum around 515 nm in the presence of calcium cations mainly responsible for water hardness.

ACIDIC STABLE POLYMER

20 The hard surface acidic liquid cleaning composition of the present invention may comprise acid stable polymer from polycarboxylate polymer, a sulphonated polystyrene polymer, a vinylpyrrolidone homopolymer or copolymer or mixtures thereof in order to improve the hydrophilicity of the surface to inhibit scale formation thus providing ease of cleaning with reduced cleaning time. The liquid acidic cleaning composition of the present invention comprise

25 maleic/acrylic acid copolymers, maleic acid/olefin copolymers, vinylpyrrolidone/dimethylaminoethylmethacrylate copolymer or mixture thereof from 0.1 wt.-% to 5.0 wt.%, preferably from 0.5wt.-% to 4.0 wt.-% and more preferably from 1.0 wt.- to 3.0 wt.-% of the total composition.

30 The term "acid stable" is referred to the polymers that preserve the chemical parameters like pH, acidity reserve of the acidic composition when it is stored.

Polycarboxylate type polymers are chosen from polymers comprising monomeric units of acrylic acid, maleic acid, olefin type unsaturated carboxylic acids. Preferred polycarboxylate polymers for use

herein are maleic acid/olefin copolymers and polyacrylate polymers. Other suitable polycarboxylate type polymer is polyacrylate polymers. These polyacrylate type polymers can be prepared based on the combination of acrylic acid with maleic acid.

5 Vinylpyrrolidone polymers exist as homo or copolymers. Homo polymers of vinylpyrrolidone for cleaning compositions can be obtained from commercially available resources. Copolymers of vinylpyrrolidone may involve copolymers of N-vinylpyrrolidone and alkenically unsaturated monomers or copolymers of vinylpyrrolidone and dialkylaminoalkyl acrylate or methacrylate copolymers. Alkenically unsaturated monomers of the copolymers can be dicarboxylic acids,
10 anhydrides and aromatics. Dicarboxylic acids can be selected from maleic acid, chloromaleic acid, fumaric acid, itaconic acid, citraconic acid, phenylmaleic acid, aconitic acid, acrylic acid, N-vinylimidazole and vinyl acetate and anhydrides can be selected from acrylates or methacrylates. Aromatic ones can be selected from styrene, sulphonated styrene, alpha-methyl styrene, vinyl toluene, t-butyl styrene. The other copolymers of vinylpyrrolidone is the quaternized or
15 unquaternized vinylpyrrolidone/dialkylaminoalkyl acrylate or methacrylate copolymers. Acid stable polymers for the present invention composition comprise preferably maleic/acrylic acid copolymers, maleic acid/olefin copolymers, vinylpyrrolidone/ dimethylaminoethylmethacrylate copolymer which are obtained from commercially available resources under the brand name of Acusol 460 NK, SOKALAN® CP 5, SOKALAN® PA 30 CL, Sorez™ HS 205.

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pH TUNER (pH OF THE COMPOSITION)

The hard surface acidic liquid cleaning composition for the present invention is prepared as acidic in order to remove limescale deposits. The liquid acidic cleaning composition is formulated at a pH in
25 the range 1.0 and 7.0, preferably in between 2.0 and 5.0. The acids to be used as pH tuners may be inorganic and organic in nature. The preferred organic acids of the present invention for pH tuning can be citric acid, sulfamic acid, fumaric acid and as the preferred inorganic acids hydrochloric acid and sulfuric acid. Additionally, pH adjusting agents basic in nature added to the present invention composition can be sodium hydroxide, potassium hydroxide, alkali metal hydroxide, alkali metal
30 carbonate, bicarbonate.

EXAMPLES

Example 1

20.0 g of Vinylpyrrolidone/Dimethylaminoethylmethacrylate Copolymer (2.0 wt.-%) is dissolved in water (976.5 g) and the mixture was stirred for an hour. pH of the medium is adjusted to 4 by using
35 pH tuners. Then, 0.0583 g of Alizarin Red S (0.004 wt.-%) is added to the reaction mixture which is

further stirred for 30 min at room temperature to give the liquid cleaning composition of the present invention.

Example 2

5 20.0 g of polyacrylate polymer (2.0 wt.-%) is dissolved in water (976.5 g) and the mixture was stirred for an hour. pH of the medium is adjusted to 4 by using pH tuners. Then, 0.0583 g of Alizarin Red S (0.004 wt.-%) is added to the reaction mixture which is further stirred for 30 min at room temperature to give the liquid cleaning composition of the present invention.

10 Example 3

20.0 g of polycarboxylate polymer (2.0 wt.-%) is dissolved in water (976.5 g) and the mixture was stirred for an hour. pH of the medium is adjusted to 4 by using pH tuners. Then, 0.0583 g of Alizarin Red S (0.004 wt.-%) is added to the reaction mixture which is further stirred for 30 min at room temperature to give the liquid cleaning composition of the present invention.

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TEST METHODS

Indication of Ca^{2+} Deposits by Using Cleaning Composition

15.0 g Ca-stearate is added to 70 mL water and 19.0 mL (15.0g) ethyl alcohol were added to mixture which was stirred for 1 hour at 60 °C. Approximately 20.0 g. of Ca-stearate pastes are applied to a
20 black tiles (25X25 cm) as a film which are dried at room temperature for 1 hour. Then, the samples are left to be dried at room temperature for 24 hours. Dual purpose acidic liquid hard surface cleaning composition are applied to the dried Ca-stearate film where in a few seconds later, color of the solution is changed from red to yellow.

25 MEASUREMENTS and EVALUATION

Samples from solutions wherein one is hard surface cleaning composition and the other one is hard surface leaning composition involving water hardness ions were transferred to the 1.0 mL quartz cuvette respectively and diluted with distilled water in such a way that the absorbance of the
30 solution is arranged to approximately 0.4. Then, UV-Vis measurements of the solutions were performed. The absorbance maximum for colorimetric dye Alizarin Red S was determined as around 425 nm in the absence of calcium cations and around 515 nm in the presence of calcium cations mainly responsible for water hardness.

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CLAIMS

1. A hard surface acidic liquid cleaning composition capable of indicating the completeness of cleaning process via colorimetric change comprising
 - 5 An acid stable polymer
 - Colorimetric single dye system
 - wherein said colorimetric single dye system is comprised of complexing dyes capable of complexing metal cations responsible for water hardness.
2. A hard surface acidic liquid cleaning composition according to claim 1 wherein said
 - 10 colorimetric single dye system is selected from metalphthalein, 3,4-dihydroxy-9,10-diazo-2-anthracene sulfonic acid (Alizarin Red S), ammonium purpurate, 1- (1- hydroxy-2-naphthylazo)-5-nitro-2-naphthol-4-sulfonic acid (Eriochrome Black T) and 1- (1-hydroxy-4-methyl-2- phenylazo)-2-naphthol-4-sulfonic acid (Calmagite).
3. A hard surface acidic liquid cleaning composition according to claim 2 wherein preferred
 - 15 colorimetric single dye system is Alizarin Red S.
4. A hard surface acidic liquid cleaning composition according to claim 1, wherein acid stable polymer can be chosen from the group consisting of polycarboxylate polymer, a sulphonated polystyrene polymer, homo or copolymer of vinylpyrrolidone and mixtures thereof.
5. A hard surface acidic liquid cleaning composition according to claim 4 wherein
 - 20 polycarboxylate polymer can be chosen from the maleic/acrylic acid copolymers, maleic acid/olefin copolymers and mixtures thereof and vinylpyrrolidone copolymer can be chosen from vinylpyrrolidone/ dimethylaminoethylmethacrylate copolymer.
6. A hard surface acidic liquid cleaning composition according to claim 1 wherein said composition is within the pH range from 1.0 and 7.0, preferably from 2.0 and 5.0.
7. A hard surface acidic liquid cleaning composition according to claim 1 comprising
 - 25 (a) Acid stable polymer from 0.1 wt.-% to 5.0 wt.%, preferably from 0.5wt.-% to 4.0 wt.-% and more preferably from 1.0 wt.- to 3.0 wt.-% of the total composition.
 - (b) Alizarin Red S from 0.001 wt.-% to 0.010 wt.-%, preferably 0.002wt.-% to 0.008wt.-%, more preferably 0.003 wt.-% to 0.006wt.-% of the total composition.
8. A hard surface acidic liquid cleaning composition according to claim 6 comprising
 - 30 a) 2.0wt.-% acid stable polymer
 - b) 0.004wt.-% Alizarin Red S
9. A process for the preparation of hard surface acidic liquid cleaning composition according to claim 1 comprises the steps of
 - 35 a) Dissolving an acid stable polymer in water and stirring at ambient temperature

- b) Adjusting the pH to 4.0 by using pH tuner
- c) Adding colorimetric dye and stirring at ambient temperature to complete solution.

10. A hard surface acidic liquid cleaning composition according to claim 9 is prepared by following the steps of

- 5 a) dissolving 2.0wt.-% vinylpyrrolidone/ dimethylaminoethylmethacrylate copolymer in water and stirring at ambient temperature
- b) adjusting the pH by using citric and sodium hydroxide
- c) adding Alizarin Red S to the mixture and stirring at ambient temperature to complete the solution.

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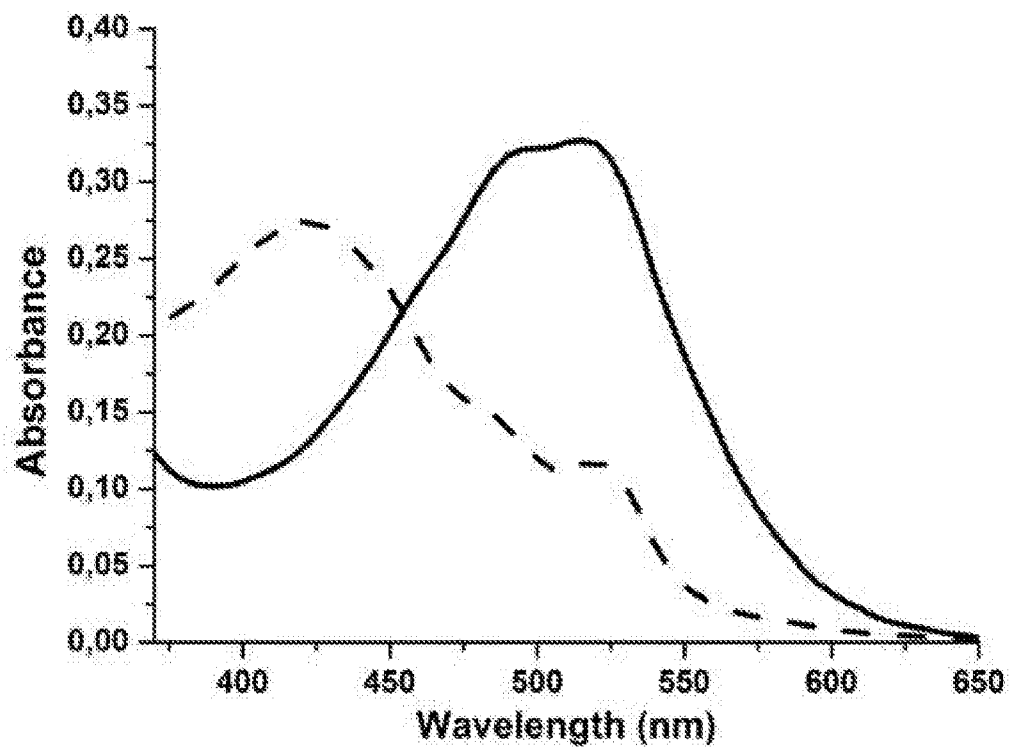


Figure1

INTERNATIONAL SEARCH REPORT

International application No

PCT/TR2016/050146

A. CLASSIFICATION OF SUBJECT MATTER

INV. C11D3/40 C11D3/37
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 255 978 A2 (UNILEVER NV [NL]; UNILEVER PLC [GB]) 17 February 1988 (1988-02-17) cited in the application page 2, line 46 - line 48; claims 1-4; example 6	1,6
Y	----- GB 1 313 180 A (UNILEVER LTD) 11 April 1973 (1973-04-11) claims 1-25	1-10
A	----- EP 1 828 364 A1 (PROCTER & GAMBLE [US]) 5 September 2007 (2007-09-05) cited in the application claims 1-6 ----- -/-	1-10

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search

16 February 2017

Date of mailing of the international search report

22/02/2017

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No

PCT/TR2016/050146

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

International application No

PCT/TR2016/050146

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