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(21) International Application Number: PCT/US96/00906 (22) International Filing Date: 18 January 1996 (18.01.96) (30) Priority Data: 08/374,918 19 January 1995 (19.01.95) US (60) Parent Application or Grant (63) Related by Continuation US 08/374,918 (CIP) Filed on 19 January 1995 (19.01.95) (71)(72) Applicant and Inventor: BLACK, Robert, H. [US/US]; 4858 Mariner Point, Jacksonville, FL 32225 (US). (74) Agent: NEIMARK, Sheridan; Browdy and Neimark, Suite 300, 419 Seventh Street N.W., Washington, DC 20004 (US).		(81) Designated States: AU, CA, JP, NZ, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>
(54) Title: AN AQUEOUS SHOWER RINSING COMPOSITION AND A METHOD FOR KEEPING SHOWERS CLEAN		
(57) Abstract <p>The invention relates to a composition for an aqueous rinsing solution for removing deposits from surfaces of showers and the like, and the use of such a composition for rinsing showers clean and for providing a pleasant sheen to shower surfaces without scrubbing or wiping. The composition includes a non-ionic surfactant having an HLB of less than 13, a chelating agent, and optionally, alcohol and/or ammonium hydroxide and/or morpholine.</p>		

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**AN AQUEOUS SHOWER RINSING COMPOSITION AND A METHOD FOR KEEPING
SHOWERS CLEAN**

BACKGROUND OF THE INVENTION

5 Field of the Invention

The invention relates to a rinsing solution composition for keeping showers and the like clean, and a method of using same.

Description of the Related Art

10 Shower stalls and tubs accumulate a steady build-up of organic and inorganic deposits on their surfaces as a result of repeated use. The accumulation of such deposits, which include insoluble soap curds, washed-off debris from the body partially coated with soap or shampoo, calcium carbonate,
15 other insoluble metal salts, and growth of mildew and microorganisms, creates an unsightly and unhealthy environment that is unacceptable from the standpoint of cleanliness and good hygiene, as well as aesthetics.

Conventionally, the build-up of deposits in a shower
20 can be cleaned with any of a number of aggressive cleaners commercially available to the consumer. These cleaners, which contain combinations of surfactants, chelating agents, oxidizers, abrasives, and soluble salts, require repeated scrubbing or wiping with the cleaner, followed generally with
25 a water rinse, to periodically remove the unsightly and unhealthy build-up in the shower. Considerable labor is required to maintain a clean shower using these conventional cleaners.

Sokol, U.S. Patent No. 4,020,016, discloses aqueous
30 cleaning compositions for dissolving soap curds that require a non-ionic surfactant having an HLB (hydrophilic-lipophilic balance) number of at least 13.1. Sokol's aqueous cleaning composition requires at least some immediate rinsing away of the composition after its application and before it dries, and
35 possibly some wiping, however minimal the amount of effort required by the user. There is no disclosure that the aqueous cleaning compositions produces a pleasant sheen on shower surfaces when dry.

At the present time, there is no acceptable product
40 for both maintaining shower surfaces clean and providing a

pleasant sheen on shower surfaces without the action of scrubbing or wiping-off of surface deposits.

SUMMARY OF THE INVENTION

5 It is, accordingly, an object of the present invention to overcome the deficiencies in the prior art, such as noted above.

Another object of the invention is to provide a composition for a shower rinsing solution for cleaning showers
10 and keeping them clean.

A further object of the invention is to provide a method of using the tub and shower rinsing composition to maintain a clean shower, provide a pleasant sheen on the tub and shower surfaces, and prevent the build-up of undesirable
15 deposits on shower surfaces.

The aqueous tub and shower rinsing composition of the present invention offers the distinct advantage of removing deposits from tub and shower surfaces while also providing a pleasant sheen on these surfaces without any
20 immediate rinsing, wiping, scrubbing or the like. The present invention makes use of the water mist formed by subsequent showering to help in the removal of shower deposits in conjunction with the earlier application of the aqueous tub and shower rinsing solution following an earlier showering by
25 the user.

The present invention relates to an easy and safe-to-use, non-streaking aqueous composition, which includes a non-ionic surfactant having a hydrophilic-lipophilic balance number (HLB) of less than 13 and preferably less than 12.5, a
30 chelating agent, and optionally, alcohol and/or ammonium hydroxide and/or morpholine, for rinsing tub and shower surfaces free from deposits, and without the necessity of wiping or scrubbing.

The present invention also relates to a method of
35 using the liquid rinsing composition to maintain clean tub and shower surfaces without scrubbing or wiping or even rinsing of the surfaces.

DETAILED DESCRIPTION OF THE EMBODIMENTS

The aqueous shower rinsing composition of the invention includes a non-ionic surfactant having an HLB of less than 13 and preferably less than 12.5, a chelating agent, and optionally, an alcohol and/or ammonium hydroxide and/or morpholine.

In accordance with the invention, a preferred embodiment of the aqueous shower rinsing solution has the following composition expressed in percent (%) by volume:

10

isopropyl alcohol	4.4%
ANTAROX BL-225 surfactant	1.5%
Hamp-ene diammonium	1.5%
EDTA 44% aqueous solution	

15

fragrance	0.002%
water	balance

The non-ionic surfactant used in the present invention advantageously removes both cationic and anionic surfactant residues and deposits and is preferably a liquid at ambient temperatures. This non-ionic surfactant also has an HLB (hydrophilic-lipophilic balance number) of less than 13.0, more preferably 12.5 or less, and most preferably about 12 or less, to avoid leaving streaks on shower surfaces and provide the desired shine. In general, the aqueous shower rinsing composition contains a non-ionic surfactant in the range of about 0.5 to 3% by volume, more preferably 1 to 2% by volume, most preferably about 1.5% by volume. It has been found that non-ionic surfactant concentrations of less than 0.5% by volume did not result in satisfactory removal of shower deposit and that concentrations above 3% left too much residual (observed as a scummy film) on shower surfaces.

ANTAROX BL-225 (Rhone-Poulenc, Cranbury, New Jersey), a mixed ethylene glycol ether (modified linear aliphatic polyether consisting of modified alkyl or alkylaryl ethoxylates having the general formula $R(OCH_2CH_2)_xR'$, where R is an alkyl or alkylaryl group, R' is a modifying cap and X represents moles of ethylene oxide) with an HLB of 12 and a

cloud point of 27°C, is the preferred non-ionic surfactant. Non-ionic surfactants, such as alkylphenol glycol ethers, sorbitan oleic ester, silicone polyalkoxylate block copolymers, mixtures thereof, and mixtures in combination with
5 ANTAROX BL-225, having an HLB of less than 13 are non-limiting examples of other suitable non-ionic surfactants.

Non-ionic surfactants are also characterized by the cloud point. Excess surfactant, exceeding the solubility limit in water, forms a dispersion and exists in micelles
10 below the cloud point. When the temperature is increased above the cloud point, the excess surfactant separates into a second phase. It will be appreciated that the HLB can be calculated or readily estimated from the cloud point. The determination of both HLB and the cloud point of non-ionic
15 surfactants are well within the knowledge and skill of ordinary artisans.

Preferably, the chelating agent is diammonium ethylene diamine tetraacetate (diammonium EDTA), such as the Hamp-ene diammonium EDTA (manufactured by Hampshire Chemical
20 Corporation, Lexington, Massachusetts), which is a 44% aqueous solution of the diammonium salt of EDTA. This commercially available 44% solution is easy to mix, economical in cost, and has low toxicity. Other chelating agents, such as but not limited to ethylene diamine tetraacetic acid (EDTA),
25 hydroxyethyl ethylene diaminetriacetic acid (HEEDTA), diethylenetriamine pentaacetic acid (DTPA), and nitrilotriacetic acid (NTA), can be substituted for diammonium EDTA on an equivalent chelating strength basis.

A 44% aqueous solution of diammonium EDTA is
30 preferably mixed in the aqueous shower rinsing composition in an amount of about 0.2 to 2.0% by volume. On an equivalent chelating strength basis, the other chelating agents mentioned above, as well as a solution of diammonium EDTA of different concentration, can be mixed in the aqueous shower rinsing
35 composition in an amount of about 0.1 to 3% by volume. There is too much residual left on the shower surfaces when the amount of chelating agent in the aqueous shower rinsing composition is above about 3% by volume whereas below 0.1% by volume of chelating agent, there is little or no removal of

shower deposits. Another disadvantage of having less than 0.1% by volume of chelating agent in the aqueous rinsing composition is that the shower surfaces, including the shower floor, are made very slippery by the non-ionic surfactant in the absence of a suitable amount of chelating agent.

Ammonium hydroxide or morpholine can be used to increase the pH of the aqueous shower rinsing solution depending on the acidity of the chelating agent. The pH of the aqueous shower rinsing solution is preferably in the range of about pH 4 to 6, more preferably in the range of about pH 4 to 5.5, and most preferably about pH 4.9. Below a pH of about 4, the solubility of the chelating agent in the aqueous rinsing composition is poor, whereas above a pH of about 6, the aqueous rinsing composition does not perform satisfactorily in removing shower deposits.

An alcohol, which increases the solvent properties and improves the sheeting action by keeping the surface tension low in order to minimize any residual film on shower surfaces, can optionally be added to the aqueous rinsing solution in the range of about 1 to 8% by volume. When the amount of alcohol in the aqueous rinsing solution is above 8%, the alcohol has a stronger, more detectable odor as well as posing a solubility problem with regard to the chelating agent. Any short-chain alcohol, such as ethyl alcohol, isopropyl alcohol, n-propyl alcohol, n-butyl alcohol, and isobutyl alcohol, can be used, although isopropyl alcohol is preferred. Ethylene glycol, propylene glycol, glycerol, the isopropyl ether of ethylene glycol, or the ethyl ether of ethylene glycol can be used as possible substitutes for a short-chain alcohol. Methyl alcohol, however, is not recommended due to its toxicity and also its high volatility.

The aqueous rinsing solution preferably contains fragrance to provide a fresh and clean smell. Although the addition of fragrance is optional, it satisfies the expectation of consumers that a clean shower would smell "fresh and clean". However, a composition which lacks a fragrance additive still performs satisfactorily in cleaning the tub and shower surfaces according to the criteria discussed below in Example 1.

Pine odor #82555 and Fresh and Clean odor #82556 (AFF, Marietta, Georgia) are commercially available and both are equally acceptable as the preferred fragrance. However, any of a number of commercially available fragrances or odor additives may be used to provide a fresh and clean smell and is well within the skill of those in the art. Generally, 0.0005% to 0.008% of fragrance additive is mixed with the aqueous rinsing solution composition based on the initial concentration of the fragrance additive supplied by the manufacturer.

The water used in this aqueous rinsing solution composition of the present invention must have negligible amounts of metal ions and be capable of not leaving any residue or deposit on evaporation from a shower surface. Distilled water or deionized water is preferred as the source of water for dilution of the individual components as well as for the water added as the balance of the composition for an aqueous shower rinsing solution.

Local conditions, such as the degree of water hardness, altitude above sea level, and the composition of typical soils, may be taken into consideration in formulating the aqueous shower rinsing composition. The amount of surfactant and chelating agent may be increased to account for greater water hardness and soils with higher calcium and magnesium levels. At higher altitudes, alcohols having lower vapor pressure can desirably be used. The viscosity of the aqueous shower rinsing composition is preferably below 20 centipoise to minimize formation of residual film on shower surfaces.

The aqueous shower rinsing composition is a dilute surfactant solution containing additional additives and is used after showering to prevent the build-up of deposits on shower surfaces. The shower rinsing solution is best sprayed onto the shower surfaces with a pump or pressurized sprayer and, for best results, the shower rinsing solution is applied to shower surfaces before the deposits dry and set. While the rinsing solution does soften and remove dried deposits, its principal benefit is the removal of the deposits that are still wet. The rinsing solution transports these undesirable

deposits down wet shower surfaces by gravity and into the shower drain. In subsequent showers, the water and mist from showering enhances the removal of deposits. Thus, a single cycle or repeated cycles of showering, spray application and drying of shower surfaces, especially when later followed by the next cycle beginning with the next showering, serve to convey deposits down to the shower drain in a semi-continuous fashion. Water rinsing following spraying can be done, but is unnecessary. No scrubbing, wiping, or other mechanical action is necessary, in contrast to conventional cleaning agents which are used to remove deposits only after such deposits have dried.

Previously accumulated build-up of undesirable deposits that have already dried and set can be softened and completely removed, albeit gradually, with continued application of the rinsing solution after each shower. While no wiping or other mechanical action is required to remove such previously dried and set deposits, gentle wiping accelerates the removal of softened deposits that have accumulated over a period of time. Wiping or even scrubbing are permissible, but unnecessary. This aqueous shower rinsing composition is not a shower or tub cleaner in the conventional sense, but is a rinsing solution for maintaining a clean shower.

Furthermore, in contrast to simply rinsing the shower surfaces with plain tap water or soapy water, both of which leave deposits, the present invention prevents streaking and air-dries spot free. Thus, the present aqueous rinsing solution provides a product for maintaining tubs and showers clean with the minimum of effort. This solution is also effective in maintaining bathtub surfaces and the like clean and spot-free even in the absence of a shower. As yet another use besides removing shower deposits and keeping showers clean, the aqueous shower rinsing solution can be applied as described above to provide a pleasant sheen, such as a light matte finish or semi-gloss sheen, to the shower surfaces when dry.

Example 1

The results of a test comparing different non-ionic surfactants having a range of HLB numbers are presented in Table 1. These results were obtained in a shower in a north Florida locality having hard water. The aqueous composition of the rinsing solutions tested all have the composition of the preferred embodiment described above with the exception that the surfactant is substituted with the test surfactants indicated in Table 1. The names in parentheses in Table 1 are Rhone-Poulenc tradenames of the non-ionic surfactants tested. The results for the tested surfactants in terms of action and surface appearance were graded based on the following criteria:

The residual film was observed on the shower surfaces after applying the test surfactants and then allowing the shower surfaces to dry without rinsing with water. The surface appearance grades are defined as follows:

20	grade A	Very streaky with tracks of build-up on a clear background.
25	grade B	Some streaking with streaks of light build-up on a lightly covered background.
	grade C	Even distribution of a thick film.
30	grade D	Even distribution of a light film giving a light matte finish to the wall surfaces and the fittings.
35	grade E	Even distribution with a semi-gloss appearance.

The action of the test surfactants observed during a showering step, subsequent to applying test surfactants and allowing shower surfaces to dry, were graded with action grades defined as follows:

5

grade 1 The mist of the shower wets only a portion of the surface. This accentuates the tracks and make them stand out.

10

grade 2 The mist of the shower unevenly wets the surface with only partial carrying away of the previous film.

15

grade 3 The mist of the shower evenly wets the surface exhibiting a glossy look. This wet film moves down the walls and carries film down to the drain.

20

Table 1

Surfactant	HLB	Action	Surface Appearance	Comments
mixed ethylene glycol ether propoxylated (ANTAROX BL-225)	12	grade 3	grade D	satisfactory
sorbitan oleic ester (ALKAMULS 400-DO)	7.2	grade 3	grade D	some residual odor, otherwise satisfactory
sorbitan oleic ester (ALKAMULS 400-MO)	11	grade 3	grade D	some residual odor, otherwise satisfactory
alkylphenol glycoether (IGEPAL RC-520)	10	grade 3	grade D	satisfactory
alkylphenol glycoether (IGEPAL DM 710)	13	grade 3	grade C	marginally satisfactory
alkylphenol glycoether (PEGOL 84)	14	grade 2	grade B	unsatisfactory
alkylphenol glycoether (IGEPAL CO 970)	18.2	grade 3	grade A	unsatisfactory
alkylethoxylates (RHODASURF BC-840)	15.4	grade 2	grade B	unsatisfactory
silicone polyalkoxylate block copolymers (ALKASIL NE 58-50)	12	grade 3	grade E	satisfactory (mist irritated nose)
1.35% v/v ethylene glycol ether (ANTAROX BL-225) + 0.15% v/v silicone polyalkoxylate block copolymers (ALKASIL NE 58-50)	12	grade 3	grade E	satisfactory

5 The foregoing description of the specific
embodiments will so fully reveal the general nature of the
invention that others can, by applying current knowledge,
readily modify and/or adapt for various applications such
specific embodiments without departing from the generic
10 concept, and, therefore, such adaptations and modifications
should and are intended to be comprehended within the meaning
and range of equivalents of the disclosed embodiments. It is
to be understood that the phraseology or terminology employed
herein is for the purpose of description and not of
15 limitation.

WHAT IS CLAIMED IS:

1. An aqueous rinsing solution for keeping shower or tub surfaces clean, comprising:

5 0.5 to 3% by volume of a non-ionic surfactant having a hydrophilic-lipophilic balance number (HLB) of less than 13, preferably less than 12.5 and most preferably 12 or less; and

0.1 to 3% by volume of a chelating agent wherein said aqueous rinsing solution has a pH in the range of 4 to 6.

10 2. The aqueous rinsing solution according to claim 1, wherein said chelating agent is selected from the group consisting of ethylene diamine tetraacetic acid, diammonium ethylenediamine triacetate, hydroxyethyl-ethylenediamine triacetic acid, diethylenetriamine-pentaacetic acid, and
15 nitrilotriacetic acid.

3. The aqueous rinsing solution of either of claims 1 and 2, further comprising 1 to 8% by volume of an alcohol.

4. The aqueous rinsing solution according to claim 3, wherein said alcohol is selected from the group consisting
20 of isopropyl alcohol, ethyl alcohol, n-propyl alcohol, n-butyl alcohol, isobutyl alcohol, and glycerol.

5. The aqueous rinsing solution according to any of claims 1-4, further comprising about 0.5 to 2% by volume ammonium hydroxide or about 0.5 to 3% morpholine.

25 6. The aqueous rinsing solution according to any of claims 1-5, further comprising distilled or deionized water.

7. The use of the composition of any of claims 1-6 as a rinsing solution to remove deposits on shower surfaces without any wiping, scrubbing or the like, which includes
30 spraying tub or shower surfaces after use with the rinsing solution to remove deposits resulting from showering.

8. The use of the composition of any of claims 1-6 as a rinsing solution to remove deposits on shower surfaces without any wiping, scrubbing or the like, which includes the
35 steps of spraying tub or shower surfaces after use with the rinsing solution and allowing the aqueous rinsing solution to remove the shower deposits by transport down the shower surfaces to the drain, and wherein the shower rinsing solution air-dries spot free and without streaking.

9. The use of the composition of any of claims 1-6 as a rinsing solution to remove deposits on tub or shower surfaces without any wiping, scrubbing or the like, consisting essentially of one or more cycles of the steps:

5 (A) wetting the surface of the tub or shower in the normal course of bathing or showering;

(B) spraying the wet surfaces of the tub or shower with the composition;

10 (C) whereby the deposits resulting from showering or bathing are removed without any wiping, scrubbing, rinsing or the like by allowing the composition to transport the deposits down the surfaces to the drain.

15 10. The use of the composition of any of claims 1-6, as a tub or shower surface shining solution where the composition is sprayed onto tub or shower surfaces to remove shower deposits on tub or shower surfaces and produce a light matte finish or semi-gloss shine.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/00906

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : C11D 1/66, 3/26, 3/43

US CL : 252/174.21, 174.22, 142, 143, 546

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)

U.S. : 252/174.21, 174.22, 142, 143, 546

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

None

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

APS

search terms: nonionic, chelant, alcohol

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4,020,016 (Sokol) 26 April 1977, see abstract, col. 1 line 63 to col. 2 line 10, col. 6 lines 3-27, col. 6 lines 43-46, example 1, table 1	1-4
Y	US, A, 5,061,393 (Linares et al.) 29 October 1991, see abstract, col. 3 lines 31-52, col. 3 lines 63-66, col. 6 lines 61-64, col. 7 lines 15-23.	1, 3-4
A	US, A 3,882,038 (Clayton et al.) 06 May 1975, see abstract.	1-4

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

18 MARCH 1996

Date of mailing of the international search report

30 APR 1996

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Facsimile No. (703) 305-3230

Authorized officer

M. Michael Tierney
MICHAEL TIERNEY

Telephone No. (703) 308-0662

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/00906

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

- 1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

- 2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

- 3. Claims Nos.: 5-10
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

- 1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
- 2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
- 3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

- 4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.