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Applicant : **UNILEVER PLC**
Unilever House Blackfriars P.O. Box 68
London EC4P 4BQ (GB)
GB

Applicant : **UNILEVER NV**
Burgemeester s'Jacobplein 1 P.O. Box 760
NL-3000 DK Rotterdam (NL)
CH DE ES FR IT LI NL SE

Inventor : **Finucane, Kevin Michael**
90 Danna Way
Saddle Brook, New Jersey 07662 (US)
Inventor : **Greene, Frederick Silvio**
5 Citroen Way
Parsippany, New Jersey 07054 (US)
Inventor : **Greene, Alan Paul**
16 Grandview Circle
Flemington, New Jersey 08822 (US)

Representative : **Fransella, Mary Evelyn et al**
Unilever PLC Patents Division P.O. Box 68
Unilever House
London EC4P 4BQ (GB)

Cleaning compositions providing improved mush reduction, mildness enhancement or both.

Cleaning compositions are described which provide mush reduction, mildness enhancement or both. Mush reduction and mildness enhancement is provided through the use of 1-15% by weight of a compound selected from a group of defined compounds added to compositions comprising fatty acid soap, detergent and free fatty acid. The mush-reducing agent also allows the compositions to be processed at low moisture levels.

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BACKGROUND TO THE INVENTIONField of the Invention

- 5 The invention relates to cleaning compositions comprising soap, detergent, free fatty acid and further comprising additives which reduce mush and/or improve mildness in said compositions.

Prior Art

- 10 Soap is mankind's oldest surfactant. Although soap is efficient at cleaning, it requires formulation to overcome many physical property defects. Additives have been discovered which improve soap's lather, fragrance, visual appeal and other aesthetic properties.

- More recently, attention has been drawn to the harshness problem of soap toward skin. Eighteen well-known toilet soaps were evaluated by Frosch & Kligman, "J. Amer. Acad. Derm.", pp. 35 (1979). Great differences were noted in their effect upon skin. Most had an appreciable irritancy. The study revealed that substantial replacement of soap with an alternative detergent such as acyl fatty isethionate would provide a more skin compatible system. Unfortunately, this alternative is expensive. Less costly solutions to the harshness problem would be desirable.

- US Pat. No. 2,894,912 (Geitz) extols the virtues of toilet bars containing 30-70% acyl fatty isethionate and 2.5 to 25% soap. As noted above, such large amounts of acyl fatty isethionate are likely to result in compositions very expensive to produce.

- Accordingly, the art teaches compositions in which major amounts of soap are combined with lesser amounts acyl fatty isethionate. US Pat. No. 4,260,507 (Barrett), for example, teaches compositions with major amounts of soap, 60-97%, combined with minor amounts, 3-40%, acyl fatty isethionate. The toilet bars produced are said to have exceptional lathering properties.

- In order to further increase mildness in compositions with lesser amounts of acyl fatty isethionate, US Pat. No. 4,695,395 (Caswell et al) teaches the use of mildness improving salts such as alkali metal isethionates. Unfortunately, compositions comprising major amounts of soap and minor amounts of detergents, as US Pat. No. 4,695,395, tend to have higher mush values than pure fatty acid soap formulations. Reduced mush values are desirable because of the negative consumer perception associated with increased mush (for example, bar melting easily in tray) and because reduced mush values are also associated with longer bar use.

- US Pat. No. 3,835,057 (Cheng et al) teaches the use of various potentiator compounds used as solvents to dissolve anti-bacterial compounds in detergent bar compositions. Among the compounds which may be used is included polyethylene glycol. Since this patent is not concerned with mildness enhancement or mush reduction, the high-soap, low detergent ranges of the compositions of the invention are not taught. Moreover, there is no indication from the reference that the potentiator compounds can be utilised as anti-mushing agents or that the potentiator compounds can be used in high soap-containing, low detergent-containing compositions to produce enhanced mildness. In addition, the majority of potentiator compounds described in the patent are either commercially unavailable, extremely expensive to make or unsafe for use in consumer products.

- 40 Accordingly, it is one object of the invention to provide relatively high soap-containing, low detergent-containing compositions with reduced amounts of mush.

It is a further object of the invention to provide compositions with enhanced mildness effects.

Finally, it is an object of the invention to provide low-mush compositions which can be processed using lower amounts of water than previously possible.

- 45 These and other objects are obtained by the addition of mush-reducing, mildness-enhancing compounds described below to compositions of the prior art.

SUMMARY OF THE INVENTION

- 50 The subject invention provides compositions providing mush-reduction, mildness-enhancement or both comprising:

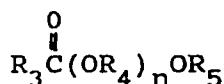
- (a) a fatty acid soap in an amount greater than 25% by weight;
- (b) 1-50% by weight detergent other than fatty acid soap;
- (c) 1-15% by weight of free fatty acid; and
- 55 (d) 1-15% by weight of a mush reducing agent selected from one of the following groups:
 - (i) $R(OR_1)_nOR_2$

wherein R is an alkyl group having from about 1 to about 22 carbons, a mono- or disaccharide sugar such as glucose or sucrose, sorbitol or a sorbitol derivative such as sorbitan;

R_1 is an alkyl group having 1 to 5 carbon atoms, preferably 2 to 3 carbon atoms;

R_2 is hydrogen, an alkyl group having from about 1 to about 22 carbons, a mono- or disaccharide sugar such as glucose or sucrose, sorbitol or a sorbitol derivative such as sorbitan or an alkenyl group having 14 to 19 carbon atoms; and

n is at least 1 and is limited only by practical molecular weight limitations at which the molecule is no longer soluble; and
(ii)



wherein R_3 is an alkyl group having from about 1 to about 21 carbon or an alkenyl group having from about 14 to about 19 carbon atoms;

R_4 is an alkyl group having 1 to 5 carbon atoms, preferably 2 to 3 carbon atoms;

R_5 is hydrogen, an alkyl group having 1 to 22 carbon atoms, an alkenyl group having from 14 to 19 carbon atoms, a mono- or disaccharide such as glucose or sucrose, sorbitol or a sorbitol derivative such as sorbitan; and

n is at least 1 and is limited only by practical molecular weight limitations at which the molecule is no longer soluble.

DETAILED DESCRIPTION OF THE INVENTION

According to the present invention, it has been found that the addition of certain defined compounds to compositions comprising fatty acid soap, detergent other than fatty acid soap and free fatty acids results in compositions having reduced mush. These compounds also impart an improved mildness benefit in the form of reduced skin irritation compared to similar soaps which do not contain the defined mush-reducing compound.

Soaps

The term "soap" is used herein in its popular sense, i.e., the alkali metal or alkanol ammonium salts of aliphatic alkane- or alkene monocarboxylic acids. Sodium, potassium, mono- di- and tri-ethanol ammonium cations, or combinations thereof, are suitable for purposes of this invention. In general, sodium soaps are used in the compositions of this invention, but from about 1% to about 25% of the soap may be potassium soaps. The soaps useful herein are the well known alkali metal salts of natural or synthetic aliphatic (alkanoic or alkenoic) acids having about 8 to 22 carbon atoms, preferably about 12 to about 18 carbon atoms. They may be described as alkali metal carboxylates of acyclic hydrocarbons having about 12 to about 22 carbon atoms.

Soaps having the fatty acid distribution of coconut oil may provide the lower end of the broad molecular weight range. Those soaps having the fatty acid distribution of peanut or rapeseed oil, or their hydrogenated derivatives, may provide the upper end of the broad molecular weight range.

It is preferred to use soaps having the fatty acid distribution of coconut oil or tallow, or mixtures thereof, since these are among the more readily available fats. The proportion of fatty acids having at least 12 carbon atoms in coconut oil soap is about 85%. This proportion will be greater when mixtures of coconut oil and fats such as tallow, palm oil, or non-tropical oils or fats are used, wherein the principal chain lengths are C_{16} and higher. Preferred soap for use in the compositions of this invention has at least about 85% fatty acids having about 12-18 carbon atoms.

Coconut oil employed for the soap may be substituted in whole or in part by other "high-lauric" oils, that is, oils or fats wherein at least 50% of the total fatty acids are composed of lauric or myristic acids or mixtures thereof. These oils are generally exemplified by the tropical nut oils of the coconut oil class. For instance, they include: palm kernel oil, babassu oil, ouricuri oil, tucum oil, cohune nut oil, murumuru oil, jaboty kernel oil, kha-kan kernel oil, dika nut oil, and ucuhuba butter.

A preferred soap is a mixture of about 15% to about 20% coconut oil and about 80% to about 85% tallow. These mixtures contain about 95% fatty acids having about 12 to about 18 carbon atoms. The soap may be prepared from coconut oil, in which case the fatty acid content is about 85% of C_{12} - C_{18} chain length.

The soaps may contain unsaturation in accordance with commercially acceptable standards. Excessive unsaturation is normally avoided.

Soaps may be made by the classic kettle boiling process or modern continuous soap manufacturing processes wherein natural fats and oils such as tallow or coconut oil or their equivalents are saponified with an

alkali metal hydroxide using procedures well known to those skilled in the art. Alternatively, the soaps may be made by neutralising fatty acids, such as lauric (C₁₂), myristic (C₁₄), palmitic (C₁₆), or stearic (C₁₈) acids with an alkali metalhydroxide or carbonate.

5 Total soap content of the instant compositions must be greater than 25 wt.%. Usually, from about 30% to 98% of the composition is soap. Preferably, the concentration of this component ranges from about 40% to 70%, more preferably 50% to 65%.

Compositions encompassed by this invention may either be in liquid or toilet bar form.

Detergents

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Detergents other than soap are also present in the formulations of this invention. Examples of these include anionic, nonionic, cationic, zwitterionic or amphoteric synthetic detergent materials or mixtures of any of these.

Anionic detergents may be chosen from the alkali metal, magnesium or ammonium salts selected from the group consisting of:

- 15 C₈-C₂₂ hydroxyalkane sulfonates,
- C₈-C₂₂ acyl isethionates,
- C₈-C₂₂ N-acyl taurinates,
- C₈-C₂₂ alkyl sulfates,
- C₈-C₂₂ alkyl ether sulfates,
- 20 C₈-C₂₂ alkyl phosphonates and phosphates,
- C₈-C₂₂ mono-alkyl succinates and maleates,
- C₈-C₂₂ dialkylsulphosuccinates,
- C₈-C₂₂ alkylamidodisulphosuccinates,
- C₈-C₂₂ alkane disulfonates,
- 25 C₈-C₂₂ alkene sulfonates
- C₈-C₁₈ alkyl glyceryl ether sulfonates, and
- C₈-C₁₈ alkyl polyglycosides.

30 Examples of nonionic synthetic detergents are the condensation products of ethylene oxide, propylene oxide and/or butylene oxide with C₈-C₁₈ alkylphenols, C₈-C₁₈ primary or secondary aliphatic alcohols, C₈-C₁₈ fatty acid amides; further examples of nonionics include tertiary amine oxides with one C₈-C₁₈ alkyl chain and two C₁₋₃ alkyl chains. Further examples are described in "Surface Active Agents and Detergents" (Vol. I and II) by Schwartz, Perry and Berch.

The average number of moles of ethylene oxide and/or propylene oxide present in the above nonionics varies from 1-30; mixtures of various nonionics, including mixtures of nonionics with a lower and a higher degree of alkoxylation, may also be used.

35 Examples of cationic detergents are the quaternary ammonium compounds such as alkyldimethylammonium halogenides.

40 Examples of amphoteric or zwitterionic detergents are N-alkylamino acids, sulphobetaines, condensation products of fatty acids with protein hydrolysates, but owing to their relatively high costs they are usually used in combination with an anionic or a nonionic detergent. Mixtures of the various types of active detergents may also be used, and preference is given to mixtures of anionic and a nonionic detergent active.

Particular preferred surfactants are the C₈-C₁₈ acyl isethionates. These esters are prepared by reaction between alkali metal isethionate with mixed aliphatic fatty acids having from 6 to 18 carbon atoms and an iodine value of less than 20. At least 75% of the mixed fatty acids have from 12 to 18 carbon atoms and up to 25% have from 6 to 10 carbon atoms.

45 Acyl isethionates, when present, will generally range from about 10% to about 40% by weight of the total composition. Preferably, this component is present from about 15% to about 30%.

Free Fatty Acids

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Free fatty acids of 8-22 carbon atoms are desirably incorporated within the compositions of the present invention. Some of these fatty acids are present to operate as superfatting agents and others as skin feel and creaminess enhancers. Superfatting agents enhance lathering properties and may be selected from fatty acids of carbon atoms numbering 8-18, preferably 10-16, in an amount up to 25% by weight of the composition. Skin feel and creaminess enhancers, the most important of which is stearic acid, are also desirably present in these compositions. Levels lower than 25% of stearic acid are, however, necessary in certain formulations where it is desired to accentuate the performance of the mildness improving salt disclosed by the present invention.

Thus, stearic acid levels in these formulations must be held between 4 and 10%, preferably between 5 and 9%, but most preferably between 6 and 8%.

Fatty acids generally comprise 1 to about 15% by weight of the composition.

5 Mush-Reducing Agent

The mush-reducing agent hereby disclosed is selected from one of the following groups:

(i) $R(OR_1)_nOR_2$

10 wherein R is an alkyl group having from about 1 to about 22 carbon atoms, a mono- or disaccharide sugar such as glucose or sucrose, sorbitol or a sorbitol derivative such as sorbitan;

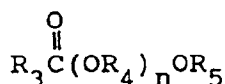
R_1 is an alkyl group having 1 to 5 carbon atoms, preferably 2 to 3 carbon atoms;

R_2 is hydrogen, an alkyl group having from about 1 to about 22 carbons, a mono- or disaccharide sugar such as glucose or sucrose, sorbitol or a sorbitol derivative such as sorbitan or an alkenyl group having 14 to 19 carbon atoms; and

15 n is at least 1 and is limited only by practical molecular weight limitations at which the molecule is no longer soluble; and

(ii)

20



25

wherein R_3 is an alkyl group having from about 1 to about 21 carbons or an alkenyl group having from about 14 to about 19 carbon atoms;

R_4 is an alkyl group having 1 to 5 carbon atoms, preferably 2 to 3 carbon atoms;

R_5 is hydrogen, an alkyl group having about 1 to about 22 carbon atoms, an alkenyl group having from 14 to 19 carbon atoms, a mono- or disaccharide such as glucose or sucrose, sorbitol or a sorbitol derivative such as sorbitan; and

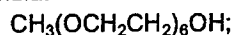
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n is at least 1 and is limited only by practical molecular weight limitations at which the molecule is no longer soluble.

Examples of compounds selected from group (i) above include:

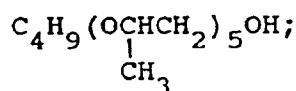
(1) polyethylene glycol 6 methyl ether manufactured by Union Carbide under the trademark Carbowax Methoxy PEG 350^R and having the formula:

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(2) PPG-5 butylether manufactured by Union Carbide under the trademark UCONLB-65^R and having the formula:

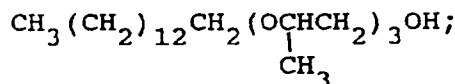
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(3) PPG-3 myristyl ether manufactured by Witco under the trademark Witconol APM^R and having the formula:

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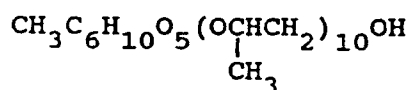
(4) Methyl gluceth-10 manufactured by Amerchol under the trademark Glucam-E10^R and having the formula:



55

and

(5) PPG-10 methyl glucose ether manufactured by Amerchol under the trademark Glucam-P10^R having the formula:

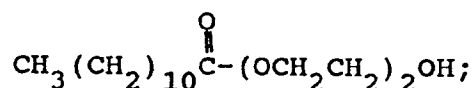


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Examples of compounds selected from group (ii) above include the following:

(1) PEG 100 Laurate manufactured by Lonza under the trademark Pegosperse 100-L^R having the formula:

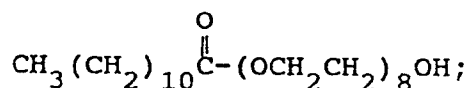
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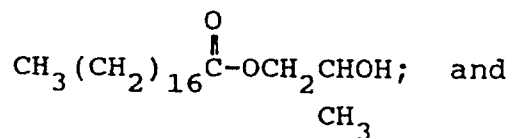
(2) PEG 400 Monolaurate manufactured by Lonza under the trademark Pegosperse 400-ML^R having the formula:

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(3) Propylene glycol monostearate manufactured by Goldschmidt under the trademark Tegin P411^R having the formula:

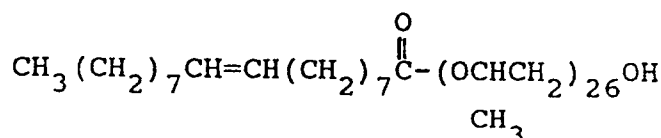
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(4) PPG-26 oleate manufactured by BASF Wyandotte under the trademark OP-2000 having the formula:

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These examples are not contemplated to be limiting examples of the many compounds which can be covered in each group.

These esters and ethers comprise from about 1% to about 15% by weight of the cleaning composition, preferably 1% - 10%, most preferably 2% - 8%.

Other Ingredients

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A preferred optional ingredient which may be used in the compositions of the invention is a skin mildness improver.

Skin mildness improvers which may be used include, for example, salts of isethionate. Effective salt cations may be selected from the group consisting of alkali metal, alkaline earth metal, ammonium, alkyl ammonium and mono-, di- or tri-alkanolammonium ions. Specifically preferred cations include sodium, potassium, lithium, calcium, magnesium, ammonium, triethylammonium, monoethanolammonium, diethanolammonium or triethanolammonium ions.

Preferred as a mildness improver, when such agents are used, are compounds of the general formula:



where R is a hydrogen or C₁ to C₉ alkyl or alkenyl radical; and M is action selected from alkali metal, alkaline earth metal, ammonium, alkyl ammonium or mono-, di- or tri-alkanolammonium ions.

A particularly preferred compound is simple, unsubstituted sodium isethionate of the general formula above wherein R is hydrogen.

The skin mildness improver may be present from about 0% to about 50% by weight of the composition. Preferably, the mildness improver is present from about 0.5% to about 25%, more preferably from about 2% to about 15%, optimally from 5% to 10%, by weight of the total composition.

Other performance chemicals and adjuncts may be needed with these compositions. The amount of these chemicals and adjuncts may range from about 1% to about 40% by weight of the total composition. For instance, from 2 to 10% of a suds-boosting detergent salt may be incorporated. Illustrative of this type additive are salts selected from the group consisting of alkali metal and organic amine higher aliphatic fatty alcohol sulfates, alkyl aryl sulfonates, and the higher aliphatic fatty acid taurinates.

Adjunct materials including germicides, perfumes, colourants, pigments such as titanium dioxide and water may also be present.

The addition of the mush-reducing agent not only reduces mush but also allows soap bars to be readily processed at low moisture levels. Specifically, the agent allows processing to occur at levels as low as 5%-6% moisture without major splitting and cracking. In addition, although relatively high mush values would be expected at these moisture levels, the mush reducing compounds keep the mush level down even at these low moisture values.

Mush Immersion Test

The mush immersion test is used as a relatively quick method of measuring a cleaning tablet's ability to absorb water and therefore disintegrate (mush). A cleaning tablet is shaved to a rectangular shape approximately 7 x 4 x 2 cm. A horizontal line is scribed across one face about 3.5 cm from the bottom. The block will be immersed in water up to this line. The dimensions below the line are measured. The surface area of the portion to be immersed is calculated. The block is weighed and then suspended in a beaker. The beaker is filled with 72°F (22.2°C) deionized water until it reaches the scribed line. The beakers sit in a constant temperature bath kept at 72°F (22.2°C). The block is allowed to sit in water for exactly two hours. The block is removed from the water, carefully shaken to remove any excess water and weighed. The difference between the net weight and the initial weight represents the water weight gained during the two hour period. The mush is then carefully removed from the block with a plastic utensil or blunt knife. The block is then wiped gently with a soft cloth to remove any excess mush not scraped off previously. The block is dried overnight and weighed. The difference between the final dry weight and the initial weight represents the block weight lost. The final mush value is calculated by adding the weight of water gained and the weight of block lost. An average of five blocks is used to assign a mush number to any composition. It is important to note that both weights, the water gained and the block lost, are important. Compositions can gain water readily without loosening the mass enough to be scraped off. Conversely, some formulations can lose large masses with only a slight water gain. Therefore the sum of both weights is necessary to accurately compare formulations.

The following examples will more fully illustrate the embodiments of this invention. These examples are intended to be of illustrative value only and are not intended to limit applicants' invention in any way. All parts, percentages and proportions referred to herein and in the appended claims are by weight of the total composition unless otherwise stated.

Basic Formulation

The basic formulations employed for this study were as follows:

| | <u>COMPONENTS</u> | <u>CONTROL (%)</u> | <u>EXPERIMENTAL (%)</u> |
|----|------------------------------|--------------------|-------------------------|
| | Soap | about 51 parts/100 | about 51 parts/100 |
| 5 | Sodium Cocoyl Isethionate | about 21 parts/100 | about 21 parts/100 |
| | Sodium Isethionate | about 6 parts/100 | about 6 parts/100 |
| | Fatty Acid | about 2 parts/100 | about 2 parts/100 |
| 10 | Water | about 10 parts/100 | about 10 parts/100 |
| | Mush Reduction Agent | --- | about 4 parts/100 |
| | *Miscellaneous Compounds | about 10 parts/100 | about 10 parts/100 |
| 15 | ----- | ----- | ----- |
| | Total | 100.0 | 100.0 |

20 *Miscellaneous compounds include various preservatives,
fragrances and antimicrobial agents.

Examples 1 - 16

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Various mush reduction compounds were placed into the composition set forth in the basic formulation over various batch moisture ranges. The results of these runs are set forth below:

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| | Example | Batch | | Mush Content (Grams Mush/ 50cm ²) |
|----|-----------------|---------------------|-------------------------------------|---|
| | | Moisture Content | Mush Reducing Compound | |
| 5 | 1 (Comparative) | 11% | - | 15.17 |
| | 2 (Comparative) | 11% | - | 15.45 |
| 10 | 3 (Comparative) | 11% | - | 14.87 |
| | 4 (Comparative) | 11% | - | 14.97 |
| | 5 | 11% | 4% PEG 6 Methyl Ether | 13.12 |
| | 6 | 11% | 4% Prop. Glycol Monostearate | 11.14 |
| 15 | 7 (Comparative) | 8-9% | - | 17.23 |
| | 8 | 5-6% | 4% PEG 100 Monolaurate | 13.14 |
| | 9 | 5-6% | 4% PEG 400 Monolaurate | 13.34 |
| 20 | 10 | 5-6% | 4% PPG-3 Myristal Ether | 13.62 |
| | 11 | 5-6% | 2% PPG-26 oleate | 14.04 |
| | 12 | 5-6% | 4% Methyl Gluceth-10 | 14.35 |
| 25 | 13 | 5-6% | 4% PPG-10 Meth. Glucose Ether | 13.64 |
| | 14 | 5-6% | 4% PEG-6 Methyl Ether | 14.69 |
| | 15 | 5-6% | 4% Propylene Gly. Mono- stearate | 12.59 |
| 30 | 16 | 5-6% | 4% PPG-5 Butyl Ether | 14.61 |

In general, batches prepared according to the Basic Formulation described above are best processed at moisture levels between 9-12%. At moisture levels about 12% the mush values decrease but the formulation is very sticky and impossible to process. At moisture levels below 8 or 9%, bar processing properties (e.g. plodding and stamping) become highly unmanageable. At these low moisture levels, the extruded plodder log tends to split and crack and the finished bar tends to develop surface deformities (cracks) as well as general sandiness. Accordingly, it would be greatly beneficial to find a compound or agent which would allow processing of low moisture batches in addition to providing mush reduction. Precisely such advantage is provided by the compounds of the invention described in the following pages.

As seen from comparative examples 1-4, when no mush reducing compound is used, the average mush value is 15.12 and mush values range between 14.8 and 15.5. Mush values can approach as high as 17 or 18 at lower batch moisture levels (comparative example 7). When the mush reduction compounds of the invention are added to batches having the same batch moisture content (examples 5 and 6), average mush value drops to 12.13. This represents a reduction in average mush value of about 20%:

| | Without Mush Reducing Compound | With Mush Reducing Compound |
|---|--------------------------------------|-----------------------------------|
| Average mush value at 11% moisture content | 15.2 | 12.13 |

As seen from the table above, dropping the batch moisture content to 5-6% (moisture levels associated with increased mush content in the prior art), produced an average mush value (average of examples 8 to 16) of 13.78. For batches containing no mush reducing compound, when a batch moisture value of only 8-9% is

used (comparative example 7), the mush value was 17.23. Thus, batches with the mush reduction compound showed an average mush reduction of about 20%:

| | <u>Without Mush Reducing Compound</u> | <u>With Mush Reducing Compound</u> |
|-----------------------------------|---|--|
| Average mush value | 17.23* | 13.78** |
| * at 8-9% batch moisture content | | |
| ** at 5-6% batch moisture content | | |

Since the prior art indicates that even higher mush values are expected at lower moisture content, it would be expected that mush values of prior art soaps having a 5-6% moisture content (if they could be processed at all at this low moisture level) would have been even higher than 17.23. Accordingly, if a direct comparison could be made, it would be appreciated that the reduction in average mush value would be higher than even 20%.

Example 17

A soap bar produced using the mush-reducing compound of the invention was compared to a similar bar, i.e. a Lever 2000^R bar similar in composition except for the absence of the mush-reducing compound, to determine the effect of this compound on mildness. The comparison was made according to the following test procedure:

The Flex Wash

The flex wash procedure consists of three daily two minute washes of the ante-cubital fossa (flex area of the elbow). This is an "exaggerated use" method which has been designed to differentiate mild products. Erythema response varies only slightly with temperature and humidity fluctuations making the protocol suitable for year round testing.

Approximately 15 panellists are used as the test population. Panellist flex areas must be free of any skin condition (eczema, dryness, irritation, cuts or abrasions). Anyone taking antihistamines, anti-inflammatory drugs (more than 8 per week) or topical, oral or injectable cortisone on a regular basis is excluded from the study. The panel is divided into two subgroups which are balanced for left handedness. Group I is assigned the control composition for the left flex and the experimental for the right flex. Group II reversed the order.

Following an evaluation, the panellist is instructed to moisten the left flex area. Sponge and test compositions (formulated as toilet bars) are dampened with tap water (100 ppm calcium/magnesium ions). The sponge is then stroked over the test bar 10 times by the evaluator. The "dosed" sponge is placed in the panellist's right hand. The panellist then washes the left flex area for exactly two minutes. Thereupon, the flex area is rinsed and patted dry. This washing procedure is repeated on the right arm with the appropriate composition. Washing by this procedure is repeated three times daily for five consecutive days for a total of 15 washes. Treatment times are scheduled 1.5 hours apart. Each test site is evaluated immediately prior to washing and 4 hours after the third daily wash.

One trained assessor evaluates test sites prior to each wash and four hours after the third wash each day for a total of 15 evaluations. The grading scale is as follows:

- 0 - no erythema
- 0.5 - barely perceptible erythema
- 1 - mild spotty erythema/no edema
- 1.5 - mild/moderate erythema/with or without edema
- 2 - moderate confluent erythema/with or without edema or vesiculation

Each test site is treated in the prescribed method until a grading of "2" or greater is attained or 15 washes are completed. When a score of "2" or greater is attained the treatment is discontinued on that flex area. The final score is then carried through for all remaining evaluations. The remaining flex area is washed until either a grading of at least "2" or 15 treatments are attained, whichever is first. In the example of this specification, the final grading, Mean Rank Scores, is the sum total of grade scores for 15 assessments per panellist averaged

over the scores from all panellists. Thus, the average score can range from 0 to 30; the lower score indicating absolutely no skin irritation, and the "30" score the most severe. Mean Endpoint Erythema scores are the mean of the valuation scores, for each panellist, at which the first arm received a grade of "2" or greater erythema score or at the completion of fifteen washes.

5 The following example illustrates the difference in mildness between Lever 2000 and a toilet bar employing PEG 400 monolaurate as a wash reduction agent.

| | <u>Mean Endpoint Erythema</u> | <u>Mean Rank Score</u> |
|---------------------------------------|-----------------------------------|----------------------------|
| 10 Bar with 4% PEG 400 Monolaurate | 1.71 | 16.39 |
| 15 Control Bar | 1.95 | 22.61 |

Statistical Analysis of Rank Scores $p=0.05$
(Wilcoxon 2 sample)

20 It can be seen from the results that these wash reduction agents offer a significant improvement in mildness relative to the control.

Claims

25 1. A cleaning composition providing wash reduction, mildness enhancement or both consisting essentially of:

- (a) a fatty acid soap in an amount greater than 25% by weight;
 (b) 1-50% by weight of a detergent other than fatty acid soap;
 (c) 1-15% by weight of free fatty acid; characterised by the presence of;
 30 (d) 1-15% by weight of a compound selected from the group consisting of:
 (i) $R(OR_1)_nOR_2$

wherein R is an alkyl group having from 1 to 22 carbon atoms, a mono- or disaccharide sugar, sorbitol, or a sorbitol derivative;

35 R_1 is an alkyl group having 1 to 5 carbon atoms;

R_2 is hydrogen, an alkyl group having from 1 to 22 carbon atoms, a mono- or disaccharide sugar, sorbitol, a sorbitol derivative or an alkenyl group having 14 to 19 carbon atoms; and

40 n is at least 1; and
 (ii)



50 wherein R_3 is an alkyl group having from 1 to 21 carbon atoms or an alkenyl group having from 14 to 19 carbon atoms;

R_4 is an alkyl group having 1 to 5 carbon atoms;

55 R_5 is hydrogen, an alkyl group having 1 to 22 carbon atoms, an alkenyl group having from 14 to 19 carbon atoms, a mono- or disaccharide, sorbitol or a sorbitol derivative; and

n is at least 1.

2. A composition according to claim 1, wherein the proportion of fatty acids in the fatty acid soap having at least 12 carbon atoms is about 85% by weight.
3. A composition according to claim 1 or 2, wherein the detergent comprises C₈-C₁₈ acyl isethionates.
4. A composition according to any preceding claim, wherein the monosaccharide is glucose.
5. A composition according to any of claims 1 to 3, wherein the disaccharide is sucrose.
6. A composition according to any preceding claim, wherein R₁ or R₄ is an alkyl group having 2 to 3 carbons.
7. A composition according to any of claims 1 to 3 and 6, wherein the sorbitol derivative is sorbitan.
8. A composition according to any preceding claim additionally comprising 0% to 50% by weight of a mildness improving salt of structure:
$$\text{HO-CHRCH}_2\text{-SO}_3\text{M};$$

wherein R is a hydrogen or C₁-C₉ alkyl or alkenyl radical; M is a cation selected from the group consisting of alkali metal, alkaline earth metal, ammonium, and mono-, di- or trialkanolammonium ions.
9. A composition according to claim 8, wherein the mildness improving salt comprises an isethionate salt.