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LONG-LIFE SUDSING BLEND AND PAD INCORPORATING SAME

Roger L. Abler, 3M Center, White Bear Lake, Minn. 55118

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ABSTRACT OF THE DISCLOSURE

The useful life of a sudsing-type solid cleaning composition is increased by intimately blending it with certain proteinaceous hydrophilic colloidal agglutinants, especially gelatin or casein. The composition is advantageously incorporated in scouring pads of various types.

BACKGROUND OF THE INVENTION

This application is a continuation-in-part of Ser. No. 18,712 filed Mar. 11, 1970 now abandoned.

It has long been common to incorporate a solid soap or synthetic detergent (preferably anionic to promote sudsing) in steel wool pads and similar cleaning products. Manufacturers of such products have consistently battled the problem of how to make the detergent dissolve readily while still preserving its availability over an extended period of time. Thus, U.S. Pat. No. 2,621,355 suggests blending corn meal or wood flour with the detergent to serve as an absorbent material. U.S. Pat. No. 3,261,675 describes a nonwoven abrasive scouring pad containing detergent material, carboxymethyl cellulose or fuller's earth being added to retard release of the detergent. U.S. Pat. No. 2,733,211 discloses the combination of synthetic detergent and film-forming binding agents such as flour, starch, sugar gum arabic, alginates, corn gluten, egg albumin, wax, cellulose derivatives, polyethylene oxides and polyvinyl alcohol. Although such additives are perhaps beneficial to a degree, they have been unsuccessful in significantly increasing the useful life of the soap or detergent composition. The most common approach to the problem has been to concentrate the cleaning composition in bars, blocks, cakes, etc. within the scouring pad, thereby reducing the surface area exposed to water; see, e.g., U.S. Pat. No. 3,261,675.

It is believed that, prior to the present invention there has been no effective method of significantly prolonging the useful life of a sudsing cleaning composition, especially when incorporated in a cleaning structure such as a scouring pad.

SUMMARY

The present invention provides a new composition of matter having particular long-life utility when incorporated in sponges, scouring pads and the like. This composition comprises an intimate blend of a solid sudsing cleaning composition and a hydrophilic proteinaceous colloidal agglutinant such as gelatin or casein. It has been discovered that when the weight of agglutinant is at least 6% of the weight of sudsing cleaning composition, the effective life of a cleaning structure incorporating the novel blend is surprisingly increased by a factor of several times over a product not containing the agglutinant. When the weight of agglutinant is more than 50% of the weight of sudsing cleaning composition, no further improvement is noted, and the greater amounts tend to impart an undesirable slimy feel to the composition. Therefore, the preferred amount of agglutinant in the blend is from 6% to 50% of the weight of the sudsing composition.

DETAILED DESCRIPTION OF THE INVENTION

Gelatin is a strong, elastic collagen-based proteinaceous emulsoid colloid which has been known and used as an adhesive for centuries. It is an odorless, dry hard, hornlike albuminoid, having a specific gravity of about 1.3 and ranging in color from pure white to light amber. Animal glue, a less pure, darker colored form of gelatin, will be considered to fall within the generic term "gelatin" hereinafter. Gelatin, which normally retains 16–18% water, swells to many times its normal volume when immersed in cold water but does not dissolve; when heated to 50° C.–60° C., the swollen gelatin passes readily into a uniform colloidal solution.

Casein, a phosphoprotein derived from milk, has also been used for many years as an adhesive. It is a colorless, odorless, tasteless conjugate protein which is very sparingly soluble in water but readily forms a colloidal solution in alkalies. It is somewhat hydroscopic and normally retains about 7–10% moisture.

The solid sudsing cleaning composition may consist merely of soap or a synthetic detergent, or may be a mixture based upon a combination including one or both types of materials. In fact, any composition containing soap and/or synthetic detergent known in the art for use in scouring pads will be significantly improved by practicing the invention.

Detergents which may be included in the sudsing cleaning composition include any natural or synthetic detergent which is normally considered nontoxic and nonirritating and is solid at room temperature. The detergent may be nonionic, anionic, or amphoteric, although anionic detergents are preferred. Among the anionic detergents which are most preferred for the solid sudsing cleaning composition are synthetic anionic detergents such as the sodium or amine salts of alkylaryl sulfonic acid (e.g., "Ultrawet" DS, a registered trademark of the Atlantic Richfield Company); soaps such as sodium or potassium salts of stearic, oleic or palmitic acids; sodium or potassium tallow, coconut oil or palm kernel soaps; sodium or amine salts of sulfonated alkyls, alkyl, sulfonic acids, sulfated alkyl ethers or sulfated ethoxyated alkyl phenols; sulfated fatty esters; and lauryl sulfate.

Among the non-ionic synthetic detergents which are suitable for use as solid sudsing compositions are solid ethoxylated alcohols, acids, phenols and esters which contain OH groups, in addition to amines, amides, ethoxylated amines and ethoxylated amides. Also desirable are solid condensation products of an alkanol amine and higher fatty acids, triglycerides, esters, amides or anhydrides.

A particularly useful sudsing-type cleaning composition for scouring pads may be prepared by blending up to 90 parts by weight of a synthetic anionic detergent of the type mentioned above with from 5 to 95 parts by weight of any of the above-mentioned room temperature solid soaps. These soaps are relatively slowly soluble and they thus tend to function as a lubricant to enhance the polishing ability of the cleaning composition containing pad. Since such soaps may counteract the suds-producing tendencies of the anionic detergents, it may be beneficial to include from about 5 to 25 parts by weight of a nonionic surfactant such as coconut monoethanol amide as a suds stabilizer. Examples of other compounds which are known to be useful as suds stabilizers are diethanolamides of fatty acids; for particular examples see Encyclopedia of Chemical Technology, Kirk-Othmer, vol. 19, pp. 550–551 (1969) Wiley, New York. To facilitate the solution or dispersion of the various components, a small amount, e.g., up to 5 parts by weight of propylene glycol or glycerine may also be added.

Useful cleaning or scouring structures in which the novel blends of the invention may be incorporated, include

natural or synthetic sponges, steel wool, nonwoven lofty low-density abrasive scouring pads, and composite structures incorporating one or more of the foregoing. Other cleaning or scouring structures include natural or cellulosic sponges, terry cloth, pads formed of narrow aluminum, bronze or plastic ribbons, or composite products of the type shown in U.S. Pats. No. 2,804,728 and No. 3,080,688. The novel long-life sudsing blend of the invention can be distributed throughout the structure of a scouring pad but it is preferably incorporated as a block in the interior of the pad.

The blend of the invention may also include compatible coloring agents, such as dyes or pigments and/or materials which improve its odor such as perfume. Such additives are well known in the soap compounding art.

DESCRIPTION OF PRESENTLY PREFERRED EMBODIMENTS

Although the previous description clearly shows that the invention is susceptible to numerous variations, it is believed that understanding will be facilitated by the subsequent listing of illustrative but non-limiting examples, in which all parts are by weight unless otherwise indicated.

In evaluating the effectiveness of the invention in prolonging the useful suds life, it has been found convenient to utilize the following test.

A detergent-impregnated pad is dried for one hour at 105° C. and then placed in a 3.8 liter cylindrical glass jar which is about 25 cm. high, 15 cm. in diameter, and fitted with a 9 cm. diameter screw cap. Two liters of tap water at about 45° C. is placed in the jar, together with the pad to be tested. The lid is firmly screwed on the jar, which is then laid on its side with its axis parallel to the line of movement of an Eberbach shaker. The shaker is activated to move the jar to and fro through a 38 mm. stroke, for 60 seconds at slow speed (180 cycles per minute), and 30 seconds at high speed (280 cycles per minute). The amount of suds is then noted, the pad removed and the sudsy water poured out. The procedure described above is repeated with fresh water until no suds are apparent at the end of the high speed cycle. It has been found empirically that the number of test cycles required to exhaust the detergent is approximately twice the number of times a housewife can use the detergent-containing scouring pad and still obtain suds.

The blends of the examples which follow are generally prepared by first soaking the gelatin in cold water for several hours or overnight and then heating the resultant mixture at about 65° C. to form a smooth 30% colloidal solution. A separate composition, formed from water and the components of the sudsing composition is heated to 65° C. and blended with the desired amount of 30% glue solution. Additional water is added as needed to achieve a suitable coating or impregnating viscosity.

The pads used in the examples below are 75 x 100 x 25 mm. in size, weighing approximately 10 grams and are cut from a web of the type described in U.S. Pat. No. 2,958,593, having a void volume greater than 90%. The web is made from 50 denier oriented polyethylene terephthalate fibers which are air-laid to form a nonwoven mat, roll-coated with a slurry of abrasive grains and polyurethane resin to bond the fibers together, the polyurethane resin cured, the bonded web spray-coated on both sides with a slurry of phenol-formaldehyde resin and abrasive granules, and the phenolic resin cured.

The pad is submerged in a solution or dispersion of the sudsing blend and thereafter passed throuhg a set of metering rolls set at approximately 6 mm. spacing. Immediately after the web emerges from the metering rolls, a strong current of air is impinged on both surfaces to cool it and, to some extent, to blow the sudsing blend toward the interior of the web, after which it is dried at about 150° C. for two minutes and at about 105° C. for one hour. The weight of a dried impregnated pad is typically 22 grams, indicating that about 12 grams of a sudsing blend has been applied.

Using the procedures described above the following examples were prepared and evaluated for suds life.

	Control	Examples 1	2	3	4	5	6
High-sudsing anionic detergent [1]	100	100	100	100	100	100	100
Soap [2]	20	20	20	20	20	20	20
Suds stabilizer [3]	40	40	40	40	40	40	40
Propylene glycol	15	15	15	15	15	15	15
Animal glue [4]		11.5	15.2	19.2	23	33	46
Weight of composition per pad, grams	14	12.5	12	12	9	16	9
Suds life, cycles	3	6	14	17	12	11	12

[1] The sodium salt of alkyl aryl sulfonate, commercially available under the trade designation "Ultrawet" DS.
[2] Tallow soap sold under the trade designation "Saratoga Chips" High Titre Soap.
[3] Coconut fatty acid monoethanol amide.
[4] "A Extra Standard" (high jelly strength) hide glue.

Example 7

A pad identical to that of Example 4 was suspended over a 37% aqueous solution of formaldehyde in a closed container, which was then placed in a 55° C. oven for 2 hours. (Formaldehyde is known to tan glue and thus reduce its moisture-sensitivity.) When subjected to the test previously described, the product of this example had a suds life of 22 cycles.

Example 8

A large hypodermic syringe, filled with an aqueous solution containing about 10 grams of the composition of Example 4, was inserted in the center of one end of a pad identical to those used in previous examples. The solution was then expelled substantially in the form of a 1 cm. x 8 cm. cylinder and the water evaporated. When the pad was tested as in previous examples, the suds life was 37 cycles. An identically prepared pad, except that the glue was omitted from the injected composition, had a suds life of 10 cycles.

Example 9

A conventional soap-filled steel wool scouring pad was subjected to the test described and found to have a suds life of 1 cycle. When an identical soap-filled pad was rinsed free of soap under hot running water, oven-dried, and then treated with the composition of Example 4, the suds life was 15 cycles. A second pad, rinsed free of soap and then treated with the composition of the previously tabulated control, showed a suds life of 6 cycles.

Example 10

A 27% solution of casein in ammonia was prepared by stirring the casein into an aqueous ammonium hydroxide solution in a water bath at about 55° C. until a smooth colloidal solution resulted. This solution was substituted for the 30% glue solution used in Example 4 and used to treat a pad identical to that used in Examples 1–8, so as to leave 15 grams of sudsing composition distributed throughout. When the pad was subjected to the suds life test, it lasted for 16 cycles.

Following the procedure of Example 8 (except using a 40% glue solution in place of the 30% solution), the following soap compositions were prepared and injected into pads identical to those described in Examples 1–8.

The pads were dried and evaluated for suds life with results as follows:

EXAMPLES 11-21

Example No.	Cleaning composition	Percent animal glue	Suds life (cycles)
11	Anionic detergent [1]	0	5
12	do	10	9
13	do	25	11
14	Nonionic detergent [2]	0	20
15	do [2]	10	30
16	do [2]	25	30
17	Soap [3]	0	12
18	do [3]	10	20
19	do [3]	25	20
20	75 parts anionic detergent [1]; 10 parts nonionic detergent [2]; 15 parts soap.[3]	0	3-4
21	75 parts anionic detergent [1]; 10 parts nonionic detergent [2]; 15 parts soap.[3]	10	30

[1] Sodium dodecylbenzene sulfonate.
[2] Coconut fatty acid monoethanol amide.
[3] Sodium tallow fatty acid soap.

What is claimed is:

1. As an article of manufacture, a scouring pad impregnated with a cleansing blend consisting essentially of a solid sudsing type cleaning composition selected from the group consisting of an ionic or nonionic detergents and mixtures thereof and a hydrophilic proteinaceous colloidal agglutinant selected from the group consisting of gelatin and casein, the weight of said hydrophilic proteinaceous agglutinant being from about 6% to 50% of the weight of said cleaning composition.

2. The article of claim **1** wherein said pad comprises a lofty low-density non-woven fibrous abrasive product.

3. The article of claim **2** wherein the weight of said blend is approximately equal to the weight of the low-density abrasive product.

4. The article of claim **1** wherein the hydrophilic proteinaceous colloidal agglutinant is gelatin.

5. The article of claim **4** wherein the gelatin is tanned.

6. The article of claim **1** wherein the pad is steel wool.

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WILLIAM E. SCHULZ, Primary Examiner

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