

**(12) PATENT**  
**(19) AUSTRALIAN PATENT OFFICE**

**(11) Application No. AU 199913147 B2**  
**(10) Patent No. 747739**

(54) Title  
**Aqueous bactericidal compositions based on alkylbenzenesulfonates and N-propanol**

(51)<sup>7</sup> International Patent Classification(s)  
**A01N 031/02**

(21) Application No: **199913147** (22) Application Date: **1998.11.06**

(87) WIPO No: **WO99/27784**

(30) Priority Data

(31) Number	(32) Date	(33) Country
<b>9725095</b>	<b>1997.11.28</b>	<b>GB</b>

(43) Publication Date : **1999.06.16**  
(43) Publication Journal Date : **1999.08.19**  
(44) Accepted Journal Date : **2002.05.23**

(71) Applicant(s)  
**Reckitt Benckiser, Inc.**

(72) Inventor(s)  
**Karen Ann McCue**

(74) Agent/Attorney  
**F B RICE and CO,605 Darling Street,BALMAIN NSW 2041**


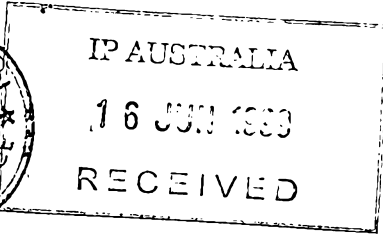
(56) Related Art  
**EP 601452**  
**WO 93/17723**



PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : A01N 31/02 // (A01N 31/02, 41:04)</p>	A1	<p>(11) International Publication Number: <b>WO 99/27784</b></p> <p>(43) International Publication Date: 10 June 1999 (10.06.99)</p>
<p>(21) International Application Number: PCT/US98/23865</p> <p>(22) International Filing Date: 6 November 1998 (06.11.98)</p> <p>(30) Priority Data: 9725095.5 28 November 1997 (28.11.97) GB</p> <p>(71) Applicant (for all designated States except US): RECKITT &amp; <del>COLMAN</del> <sup>Benckiser</sup> INC. [US/US]; 1655 Valley Road, Wayne, NJ 07474 (US).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): McCUE, Karen, Ann [US/US]; 166 Westervelt Avenue, Tenafly, NJ 07670 (US).</p> <p>(74) Agents: PARFOMAK, Andrew, N. et al.; Fish &amp; Richardson P.C., Suite 2800, 45 Rockefeller Plaza, New York, NY 10111 (US).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p> <div style="text-align: right;">   </div>
<p>(54) Title: AQUEOUS BACTERICIDAL COMPOSITIONS BASED ON ALKYL BENZENESULFONATES AND N-PROPANOL</p>		
<p>(57) Abstract</p> <p>Aqueous compositions comprising a synergistic combination of n-propyl alcohol and linear alkylbenzenesulfonate, especially dodecyl benzene sulfonate which provides good germicidal efficacy against both gram positive and gram negative bacteria on hard surfaces and the like. Processes for the sanitization of hard surfaces wherein the presence of gram positive and/or gram negative bacteria is suspected, is also disclosed.</p>		

AQUEOUS BACTERICIDAL COMPOSITIONS BASED ON ALKYL BENZENESULFONATES  
AND N-PROPANOL

The present invention relates to aqueous bactericidal compositions based on a synergistic combination of anionic surfactants and alcohols. These compositions find use in a variety of applications for the sanitization of surfaces and articles wherein the presence of bacteria is suspected. The compositions also find use in cleaning and disinfecting compositions.

Known to the art are formulations in US 5122541 which describes certain aqueous sprayable surface disinfectant compositions which include 20 - 30% by weight of a mixture of ethyl alcohol and isopropyl alcohol in a weight ratio of 1:2 - 2:1, and 0.05 to 0.5%wt of a mixture of anionic surfactants of the sulfonate or sulfate type, wherein the compositions are maintained in at a pH in the range of from about 2 to about 6, or about 8 to about 12.

While this and other prior art compositions are advantageous in certain respects, there remains a continuing need in the art for further improved formulations which provide a useful germicidal effect, especially those useful in the sanitization of hard surfaces and the like.

The present invention provides an aqueous liquid disinfectant composition which is particularly useful in the disinfection of surfaces wherein the presence of gram positive type pathogenic bacteria such as *Staphylococcus aureus*, and/or the presence of gram negative type pathogenic bacteria such as *Salmonella choleraesuis* is suspected.

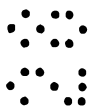
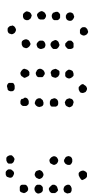
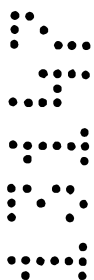
In a first aspect, the present invention is directed to an aqueous hard surface sanitizing composition which comprises:  
7.5 - 10% wt. of n-propyl alcohol and  
0.05 - 2%wt. of dodecyl benzene sulfonate,  
wherein said sanitizing composition provides at least a log 2 reduction using a Microbial Reduction Assay against *Salmonella choleraesuis* or *Staphylococcus aureus* for a 5 minute contact time.

The present invention also provides a process for the disinfection of surfaces, especially hard surfaces, wherein the presence of gram positive type pathogenic bacteria and/or gram positive type pathogenic bacteria are suspected.



In another aspect, the present invention is directed to a process for the sanitization of surfaces and articles wherein the presence of bacteria is suspected which comprises the process step of:

- 5 contacting the surface with a disinfecting effective amount of a composition according to the first aspect of the invention for a sufficient time to sanitize said surface.



The present invention also provides a fast acting, liquid disinfectant composition useful for the disinfection of surfaces, especially hard surfaces wherein the presence of both gram positive type pathogenic bacteria and gram negative type pathogenic bacteria is suspected.

In accordance with the present invention, there has been found a synergistic combination of n-propyl alcohol and at least one linear alkylbenzenesulfonate which provides good germicidal efficacy against both gram positive and gram negative bacteria on hard surfaces and the like, which may be readily added to form part of an aqueous based composition. Desirably the total amount of n-propyl alcohol present is at least about 7.5%wt., more desirably in an amount of from 7.5% by weight to 10% by weight, based on the total weight of the composition of which it forms a part. Desirably the linear alkylbenzenesulfonate is present in an amount of at least about 0.05%wt., more preferably is present in an amount of from 0.05 – 2% by weight, based on the total weight of the composition having 100%wt. of which it forms a part.

Most desirably the linear alkylbenzenesulfonate is dodecyl benzene sulfonate.

Such a result is surprising as it has been found that similar alcohols, even isopropanol, and similar surfactants do not provide the same type beneficial level of germicidal efficacy achieved with the synergistic combination which only the present inventor has discovered.

According to a preferred aspect of the invention, there is provided an aqueous sanitizing composition which includes n-propyl alcohol and dodecyl benzene sulfonate as described above, wherein said sanitizing composition is useful against both gram positive and gram negative bacteria. In accordance with a further aspect of the invention, there is provided such an aqueous sanitizing composition which is fast acting, particularly as demonstrated by the examples discussed below. Both the n-propyl alcohol and the dodecyl benzene sulfonate are commercially available. The n-propyl alcohol is available from a variety of sources; the dodecyl benzene sulfonate is commercially available as a



salt form in a surfactant preparation marketed under the tradename Calsoft® L-60 which is described to be a sodium dodecyl benzene sulfonate.

In accordance with certain particularly preferred embodiments, there is provided an aqueous sanitizing composition wherein is present a linear alkylbenzenesulfonate in an amount of from 0.05-2%wt., and more preferably is a salt of dodecyl benzene sulfonate, especially sodium dodecyl benzene sulfonate and n-propanol which is present in an amount of 7.5 – 10%wt. based on the total weight of the composition of which these two constituents form a part.

The aqueous compositions according to the invention, in addition to n-propyl alcohol and dodecyl benzene sulfonate mixture denoted above, may further include one or more conventional constituents including but not limited to: further non-aqueous solvents, chelators, building agents, pH buffering agents, perfumes, perfume carriers, stabilizing agents, coloring agents, hydrotropes, anti-foaming agents, as well as one or more nonionic, cationic, anionic, amphoteric or zwitterionic surfactants; one or more of these may be included in any amount which do not undesirably detract from the antimicrobial activity of the compositions. Such materials are known to the art, including those described in *McCutcheon's Emulsifiers and Detergents (Vol. 1)*, *McCutcheon's Functional Materials (Vol. 2)*, North American Edition, 1991; *Kirk-Othmer, Encyclopedia of Chemical Technology*, 3rd Ed., Vol. 22, the contents of which are herein incorporated by reference. For any particular composition, such optional ingredients should be compatible with the other ingredients present.

It is to be understood also, that the aqueous compositions according to the invention also include, or may consist essentially of, the n-propyl alcohol and one or more linear alkylbenzenesulfonates, particularly the most preferred dodecyl benzene sulfonates and water, without further conventional constituents. In a further alternative, inventive compositions include, or may consist essentially of the n-propyl alcohol and one or more linear alkylbenzenesulfonates, particularly the most preferred dodecyl benzene sulfonates and water, optionally further with one or more conventional constituents but excluding surfactants.

It is further to be understood that the dodecyl benzene sulfonate according to the invention may be used in either its free acid form or as a salt form, where such salts include alkali metal and alkaline earth metal salts, and especially sodium, potassium and chlorine.

5 A particular advantage of the inventive compositions is the fact that in preferred embodiments, they comprise relatively low amounts of volatile organic constituents. Of increasing interest are the provision of products which satisfy the stringent requirements of the US Environmental Protection Agency for low volatile organic content ("low VOC") products. According to specific preferred embodiments the ready to use  
10 disinfecting compositions provided herein meet such stringent requirements.

The inventive compositions may be used in a wide variety of disinfecting applications and in a wide variety of environments which may benefit from a disinfecting effect. These applications and environments include usage in the medical sector for the disinfection of instruments and apparatuses, as well as for disinfection or  
15 decontamination of operating theaters and fixtures therein. The use of the compositions for the disinfection or decontamination of hospital environments specifically include: lavatories and lavatory fixtures, hospitals, clinics, examining rooms, and other environments associated with the provision of healthcare services and wherein the presence of gram positive bacteria and/or gram negative bacteria are suspected is also  
20 expressly contemplated. Such environments are to be understood to include not only the surfaces of walls, ceilings and floors, but to specifically include other surfaces such as the surfaces of various health care apparatus which may be found in such environments wherein healthcare surfaces are provided. The use of the inventive compositions provides an effective and simple to use method for the disinfection of such environments.

25 The inventive compositions are particularly to be understood to include hard surfaces. By way of non-limiting example, hard surfaces suitable for coating with the polymer include surfaces composed of refractory materials such as: glazed and unglazed tile, brick, porcelain, ceramics as well as stone including marble, granite, and other stones surfaces; glass; metals; plastics e.g. polyester, vinyl; fiberglass, Formica®, Corian® and  
30 other hard surfaces known to the industry. Hard surfaces which are to be particularly

denoted are lavatory fixtures such as shower stalls, bathtubs and bathing appliances (racks, curtains, shower doors, shower bars) toilets, bidets, wall and flooring surfaces especially those which include refractory materials and the like. Further hard surfaces which are to be denoted are those associated with kitchen environments and other environments associated with food preparation, including cabinets and countertop surfaces as well as walls and floor surfaces especially those which include refractory materials, plastics, Fiberglass®, Formica®, Corian® and stone.

The compositions according to the invention can be desirably provided as a ready to use product in a manually operated spray dispensing container. Such a typical container is generally made of synthetic polymer plastic material such as polyethylene, polypropylene, polyvinyl chloride or the like and includes spray nozzle, a dip tube and associated pump dispensing parts and is thus ideally suited for use in a consumer "spray and wipe" application. In such an application, the consumer generally applies an effective amount of the composition using the pump and a short time thereafter, wipes off the treated area with a rag, towel, or sponge, or other material. In this manner, disinfection of the treated surface may be achieved.

In a yet a further embodiment, the compositions according to the invention may be formulated so that it may be useful in conjunction with a "aerosol" type product wherein it is discharged from a pressurized aerosol container. Known art propellants such as liquid propellants based on chlorofluorocarbons or propellants of the non-liquid form, i.e., pressurized gases, including carbon dioxide, air, nitrogen, as well as others, may be used, even though it is realized that the former chlorofluorocarbons are not generally further used due to environmental considerations. In such an application, a composition according to the invention is dispensed by activating the release nozzle of said aerosol type container onto a surface in need of disinfection, and generally in accordance with a manner as above-described is removed with the use of a rag, towel, or sponge, or other material.

It is to be understood that the compositions according to the invention may be applied to a surface which is in need of disinfection, particularly where the presence of gram positive and/or gram negative bacteria are suspected.



In particularly preferred embodiments the compositions according to the invention provide at least a log 2 reduction using a Microbial Reduction Assay against either *Salmonella choleraesuis* (gram negative type pathogenic bacteria) and *Staphylococcus aureus* (gram positive type pathogenic bacteria) for a 5 minute contact time, and more preferably for a 1 minute contact time. Preferably, the preferred embodiments of the inventive compositions are effective against both either *Salmonella choleraesuis* (gram negative type pathogenic bacteria) and *Staphylococcus aureus* (gram positive type pathogenic bacteria) for a 5 minute contact time, and more preferably for a 1 minute contact time.

According to further particularly preferred embodiments there are provided compositions according to the invention which consist essentially of from 0.05-2%wt of a linear alkylbenzenesulfonate, especially a salt of dodecyl benzene sulfonate, especially sodium dodecyl benzene sulfonate, 7.5 – 10%wt. of n-propanol, with the remaining balance to 100%wt. being water, wherein such composition provides at least a log 2 reduction using a Microbial Reduction Assay against either *Salmonella choleraesuis* (gram negative type pathogenic bacteria) and *Staphylococcus aureus* (gram positive type pathogenic bacteria) for a 5 minute contact time. In particularly preferred embodiments, the inventive compositions are effective against both either *Salmonella choleraesuis* (gram negative type pathogenic bacteria) and *Staphylococcus aureus* (gram positive type pathogenic bacteria) for a 5 minute contact time, and more preferably for a 1 minute contact time.

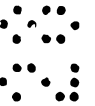
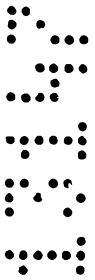
One skilled in the art will recognize that modifications may be made in the present invention without deviating from the spirit or scope of the invention. The invention is illustrated further by the following examples which are not to be construed as limiting the invention or scope of the specific procedures described herein.



Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

Examples

For purposes of illustration of the present inventive compositions, various formulations were produced and are reported below; comparative formulations are illustrated on Table



1, while formulations according to the invention are described in Table 2 below. These formulations were produced generally in accordance with the following protocol.

Into a suitably sized vessel, a measured amount of room temperature water (approx. 68°F, 20°C) was provided after which measured amounts of remaining  
5 constituents were added. All of the remaining constituents were similarly supplied at room temperature; mixing of the constituents was achieved by the use of a magnetic stirrer apparatus. Mixing, which generally lasted several minutes, and maintained until the particular exemplary formulation appeared to be homogeneous.

It is to be noted that the constituents might be added in any order, but it is  
10 preferred that water be the initial constituent provided to a mixing vessel or apparatus as it is the major constituent and addition of the further constituents thereto is convenient.

The exact compositions of the example formulations are listed on Table 1; the weights given are the "as is" weight of materials as supplied by their respective supplier, and unless otherwise indicated, the weight percents of the active portion of each of the  
15 constituents are to be understood to represent 100% by weight.

**Table 1**

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
Ethanol	--	10.0	--	--	10	5.0	10	10	--	--	--	--	--	--	--
isopropanol	--	--	--	--	--	--	--	--	--	--	--	10.0	--	--	--
Dowanol DB	--	--	--	--	--	--	--	--	--	--	--	--	5.0	--	--
n-propanol	10.0	--	--	--	--	--	--	--	5.0	5.0	--	--	--	10.0	10.0
Hostapur SAS	--	--	--	--	--	--	2.0	--	--	--	--	--	--	2.0	--
Standapol SLS	--	--	--	--	--	--	--	1.0	--	--	--	--	--	--	2.0
Biosoft D-40	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--
Calsoft L-60	--	--	--	2.0	2.0	2.0	--	--	--	0.05	--	2.0	2.0	--	--
water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
<b># of Log10 reduction</b>															
<b>1 Minute:</b>															
S.cholerasuis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.aureus	0.0	0.0	2.8	2.6	2.6	2.3	2.9	3.5	0.0	1.8	3.6	3.5	1.1	3.5	3.5
<b>5 Minutes:</b>															
S.cholerasuis	4.4	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	2.2	1.0	0.0	0.0	1.4
S.aureus	0.0	0.0	3.3	3.9	3.9	2.3	3.8	3.9	0.1	2.3	4.4	4.1	1.0	4.5	6.3

Dowanol DB is diethylene glycol n-butyl ether (Dow Chemical Co.)  
 Hostapur SAS is a sodium secondary alkane sulfonate (60%wt. actives) (Hoechst AG)  
 Standapol SAS is a sodium lauryl sulfonate (\_\_\_%wt. actives) (Henkel Corp.)  
 Biosoft D-40 is a sodium linear alkylate sulfonate (40%wt. actives) (Stepan Co.)  
 Calsoft L-60 is sodium salt of an dodecyl benzene sulfonate (60%wt. actives) (Pilot Chemical Co.)

1  
8  
1

<b>Table 2</b>								
	<b>E1</b>	<b>E2</b>	<b>E3</b>	<b>E4</b>	<b>E5</b>	<b>E6</b>	<b>E7</b>	<b>E8</b>
ethanol	--	--	--	--	--	--	--	--
isopropanol	--	--	--	--	--	--	--	--
Dowanol DB	--	--	--	--	--	--	--	--
n-propanol	10	10	10	10	10	10	10	7.5
Hostapur SAS	--	--	--	--	--	--	--	--
Standapol SLS	--	--	--	--	--	--	--	--
Biosoft D-40	--	--	--	--	--	--	--	--
Calsoft L-60	2	2	2	0.5	0.5	0.06	0.05	2
water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
<b># of Log10 reduction</b>								
<b>1 Minute:</b>								
S.cholerasuis	4.7	5.8	4.7	6.7	5.3	6.7	4.9	4.9
S.aureus	5.2	3.4	3.6	3.3	3.3	3.1	2.9	2.9
<b>5 Minutes:</b>								
S.cholerasuis	4.9	5.6	4.4	6.9	6.9	6.9	4.3	4.3
S.aureus	5.0	4.2	4.2	3.5	3.3	3.6	3.5	3.5

Dowanol DB is diethylene glycol n-butyl ether (Dow Chemical Co.)

Hostapur SAS is a sodium secondary alkane sulfonate (60%wt. actives) (Hoechst AG)

Standapol SAS is a sodium lauryl sulfonate (\_\_\_%wt. actives) (Henkel Corp.)

Biosoft D-40 is a sodium linear alkylate sulfonate (40%wt. actives) (Stepan Co.)

Calsoft L-60 is sodium salt of an dodecyl benzene sulfonate (60%wt. actives) (Pilot Chemical Co.)

The sanitizing efficacy of the inventive compositions were determined as follows:

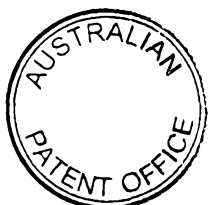
Formulations described on Tables 1 and 2 above, were evaluated for antimicrobial efficacy using a Microbial Reduction Assay against *Salmonella choleraesuis* (gram negative type pathogenic bacteria) and *Staphylococcus aureus* (gram positive type pathogenic bacteria). The test protocol followed for each sample was generally as follows.

1. Inoculation of the Samples:

- A. Inoculate 1.0 ml of the 24 hour test culture into each 9.0 ml sample tube; and test in duplicate.
- B. Subculture 1.0 ml of the sample after 1 or 5 minutes contact time with the respective diluted Example formulation.
- C. Subculture the sample into 9.0 ml of DIFCO AOAC Letheen Broth to form a "10<sup>-1</sup> Sample" dilution.

2. Sample Dilutions and Plating

- A. Plate the 10<sup>-1</sup>, 10<sup>-3</sup>, and 10<sup>-5</sup> dilutions for each sample/organism/contact time combination by the following general protocol:
  1. From the 10<sup>-1</sup> "Sample" dilution, plate 1.0 ml to form a 10<sup>-1</sup> "Sample" plate.
  2. Pipette and transfer 0.1 ml of the 10<sup>-1</sup> Sample dilution into 9.9 ml of DIFCO AOAC Letheen Broth to form a "10<sup>-3</sup> Sample" dilution and form a 10<sup>-3</sup> plate.
  3. Pipette and transfer 0.1 ml of 10<sup>-3</sup> Sample dilution to 9.9 ml DIFCO AOAC Letheen Broth to form a "10<sup>-5</sup> Sample" dilution and form a 10<sup>-5</sup> plate.
- B. Pour each of the 10<sup>-1</sup> plates, 10<sup>-3</sup> plate, and 10<sup>-5</sup> plate with Tryptic Soy Agar containing polysorbate 80 and lecithin (either DIFCO or BBL).



C. Incubate the plates for 48 hours at 35°C.

3. Control Counts: Dilutions and Plating

A. Inoculate 1.0 ml of 24 hour test culture into 9.0 ml DIFCO AOAC  
Lethen Broth to form a "Control" dilution.

5 B. Subculture 1.0 ml of the Control dilution into 9.0 ml DIFCO  
AOAC Lethen Broth at 1 and at a 5 minute exposure; these are  
the "10<sup>-1</sup> Control" dilution tubes for the 1 and 5 minute contact  
time controls.

10 C. Plate 10<sup>-4</sup> and 10<sup>-5</sup> dilutions of the 10<sup>-1</sup> Control dilution for each  
contact time by the following protocol:

1. Pipette 0.1 ml of the 10<sup>-1</sup> Control dilution into 9.9 ml  
DIFCO AOAC Lethen Broth to form a "10<sup>-3</sup> Control" dilution.

15 2. Plate 1.0 ml of the 10<sup>-3</sup> Control dilution into 9.0 ml DIFCO  
AOAC Lethen Broth to form a "10<sup>-4</sup> Control" dilution and form a  
"10<sup>-4</sup> Control" plate.

3. Pipette 0.1 ml of the 10<sup>-3</sup> Control dilution into 9.9 ml of ml  
DIFCO AOAC Lethen Broth to form a "10<sup>-5</sup> Control" dilution,  
and to form a "10<sup>-5</sup> Control" plate.

20 4. Pour the 10<sup>-4</sup> and 10<sup>-5</sup> Control plates with Tryptic Soy Agar  
containing polysorbate 80 and lecithin, and incubate at 35°C for  
48hr.

4. Calculation of Log<sub>10</sub> Reduction:

25 A. Determine the number of bacteria survivors at each contact time  
for both the controls and test samples of each of the plates  
produced in accordance with the protocols outlined for steps 1 - 3  
denoted above.

1. Count the number of colonies on the petri dish. The plate  
is acceptable for counting with a colony count between 25 and 250.

30 2. Multiply the number of colonies by the plate dilution factor  
= the number of surviving bacteria/ml.

B. Determine the numbers of Log<sub>10</sub> reduction in bacteria for each sample/organism/contact time combination in accordance with the following equation:

$$\text{Log}_{10} (\text{Control Count}) - \text{Log}_{10} (\text{Survivor Count}) = \# \text{Log}_{10} \text{ of bacteria reduction}$$

5

For this test with a contact time of 1 minute and 5 minutes, a Log<sub>10</sub> reduction value of 3 or greater against both organisms is acceptable for “passing” performance (i.e., broad spectrum antimicrobial activity), any lesser Log<sub>10</sub> reduction value indicates unacceptably poor antimicrobial efficacy. The results of this evaluation are summarized on Tables 1 and 2, above, as indicated with respect to the particular formulation being evaluated.

10

•••••

•••••

•••••

•••••

15 •••••

As may be seen from the results indicated, the formulations of Table 2 consistently provided superior antimicrobial performance against both gram positive and gram negative pathogenic bacteria. This result is surprising as results of a 10%wt. aqueous dilution of n-propanol (C1) are somewhat effective against *S.cholerasuis* but only at a 5 minute contact time, but have no effect against *S.aureus*. Conversely a 2%wt. aqueous dilution of the sodium salt of an dodecyl benzene sulfonate(C4) is somewhat effective against *S.aureus*, at both 1 and 5 minute contact times, but has no effect against *S.cholerasuis*. Compositions within the scope of the present invention, non-limiting examples of which are illustrated on Table 2 show much higher efficacy levels against both *S.aureus*, and *S.cholerasuis*, and at the same time, at much shorter contact times. Such superior results are surprising and unexpected.

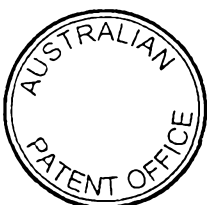
20

•••••

Several of the exemplary formulations described in more detail on Table 1 and Table 2 above were further evaluated in order to evaluate their antimicrobial efficacy against *Salmonella choleraesuis* (gram negative type pathogenic bacteria) (ATCC 10708). The testing was performed in accordance with the protocols outlined in “Use-Dilution Method”, Protocols 955.14, 955.15 and 964.02 described in Chapter 6 of “Official Methods of Analysis”, 16<sup>th</sup> Edition, of the Association of Official Analytical Chemists;

25

•••••





the contents of which are herein incorporated by reference. This test is also commonly referred to as the "AOAC Use-Dilution Test Method".

As is appreciated by the skilled practitioner in the art, the results of the AOAC Use-Dilution Test Method indicates the number of test substrates wherein the tested organism remains viable after contact for 10 minutes with at test disinfecting composition / total number of tested substrates (cylinders) evaluated in accordance with the AOAC Use-Dilution Test. Thus, a result of "0/40" indicates that of 60 test substrates bearing the test organism and contacted for 10 minutes in a test disinfecting composition, 0 test substrates had viable (live) test organisms at the conclusion of the test. Such a result is excellent, illustrating the excellent disinfecting efficacy of the tested composition.

Results of the antimicrobial testing are indicated on Table 3, below. The reported results indicate the number of test cylinders with live test organisms/number of test cylinders tested for each example formulation and organism tested.

Formulation:	<i>Salmonella choleraesuis</i>
C1	12/40
E2	0/40

As may be seen from the results indicated above, the compositions according to the invention provide excellent antimicrobial efficacy of these compositions against known bacteria commonly found in bathroom, kitchen and other environments.

As may be readily determined by inspection of the results obtained and reported in Tables 1 and 2, the dodecyl benzene sulfonate surfactant, specifically the Calsoft T-60 surfactant preparation, in conjunction with the n-propanol surprisingly provided superior disinfecting efficacy as compared to combinations of other sulfate or sulfonate based surfactant compounds, as well as with other alcohols or glycol ether solvents.

While the invention is susceptible of various modifications and alternative forms, it is to be understood that specific embodiments thereof have been shown by way of



example in the drawings which are not intended to limit the invention to the particular forms disclosed; on the contrary the intention is to cover all modifications, equivalents and alternatives falling within the scope and spirit of the invention as expressed in the appended claims.

5

\\NYC\VOL1\USERS\ANP\FR\08291\318001\318PATUS.DOC

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An aqueous hard surface sanitizing composition which comprises:  
7.5 – 10%wt. of n-propyl alcohol and  
5 0.05-2%wt. of dodecyl benzene sulfonate,  
wherein said sanitizing composition provides at least a log 2 reduction using a  
Microbial Reduction Assay against *Salmonella choleraesuis* or *Staphylococcus aureus* for a 5 minute contact time.

10 2. An aqueous hard surface sanitizing composition according to claim 1 which  
comprises:  
7.5 – 10%wt. of n-propyl alcohol and  
0.05-2%wt. of dodecyl benzene sulfonate,  
wherein said sanitizing composition provides at least a log 2 reduction using a  
15 Microbial Reduction Assay against *Salmonella choleraesuis* and  
*Staphylococcus aureus* for a 1 minute contact time.

3. An aqueous hard surface sanitizing composition according to claim 1 which  
consists essentially of:  
20 7.5 – 10%wt. of n-propyl alcohol and  
0.05-2%wt. of dodecyl benzene sulfonate,  
to 100%wt. water,  
wherein said sanitizing composition provides at least a log 2 reduction using a  
Microbial Reduction Assay against *Salmonella choleraesuis* or *Staphylococcus aureus*  
25 for a 5 minute contact time.

4. An aqueous hard surface sanitizing composition according to claim 3 which  
consists essentially of:  
30 7.5 – 10%wt. of n-propyl alcohol and



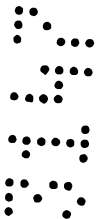
0.05-2%wt. of dodecyl benzene sulfonate,  
to 100%wt. water,  
wherein said sanitizing composition provides at least a log 2 reduction using a  
Microbial Reduction Assay against *Salmonella choleraesuis* or *Staphylococcus aureus* for a 1 minute contact time.

5

5. A process for the sanitization of surfaces and articles wherein the presence of bacteria is suspected which comprises the process step of:

contacting the surface with a disinfecting effective amount of a composition according to any preceding claim for a sufficient time to sanitize said surface.

10



6. An aqueous hard surface sanitizing composition according to any one of claims 1 to 4, which includes one or more conventional constituents including: further non-aqueous solvents, chelators, building agents, pH buffering agents, perfumes, perfume carriers, stabilizing agents, coloring agents, hydrotropes, antifoaming agents, as well as one or more nonionic, cationic, anionic, amphoteric or zwitterionic surfactants.

15



20



DATED this 28th day of June 2000

RECKITT BENCKISER INC.,  
Patent Attorneys for the Applicant:

F.B. RICE & CO.

