# United States Patent [19]

**Marumo**

[11] **3,888,797**

[45] **June 10, 1975**


[54] **DETERGENT COMPOSITION**


[75] Inventor: **Hideo Marumo,** Tokyo, Japan

[73] Assignee: **Carapus Company, Limited,** Tokyo, Japan



[22] Filed: **May 7, 1973**

[21] Appl. No.: **357,579**

**Related U.S. Application Data**

[62] Division of Ser. No. 250,653, May 5, 1972.

[30] **Foreign Application Priority Data**

May 10, 1971 Japan ..... 46-30391
Jan. 26, 1972 Japan ..... 47-9019

[52] **U.S. Cl.** ..... **252/527;** 260/534 R; 260/534 E; 260/534 M; 252/DIG. 10; 252/DIG. 13; 252/DIG. 14

[51] **Int. Cl.** ..... **C11d 3/066;** C07c 101/04; C07c 101/24

[58] **Field of Search** ..... 260/534 R, 534 E, 534 M; 252/527



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,446,478 | 8/1948 | Kremers | 260/534 M X |
| 3,539,572 | 11/1970 | Schroder et al. | 260/534 R X |
| 3,726,797 | 4/1973 | Sundby | 252/527 X |

FOREIGN PATENTS OR APPLICATIONS

| | | |
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| 1,167,192 | 10/1969 | United Kingdom |
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| 1,218,251 | 1/1971 | United Kingdom |

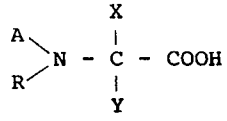


*Primary Examiner*—Leland A. Sebastian
*Attorney, Agent, or Firm*—Cushman, Darby & Cushman

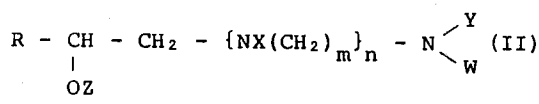


[57] **ABSTRACT**

A new detergent composition at least one of surface active agents represented by the general formula (I), its organic amine salts, ammonium salts, alkali metal salts and nonalkali metal salts, or their acid complex salts, and/or an amphoteric surfactant derived from a compound of the general formula (II) by treatment with an amphoterizing agent, its organic amine salts, ammonium salts, alkali metal salts, non-alkali metal salts or their acid complex salts, as an active component:



(I)



(II)

where A, B, X, Y, R, Z, W, *m*, *n* are as defined in the specification. The present surface active agent can be used widely as a detergent either independently or together with any known detergent. The composition exhibits an excellent detergency, bubble formability and bubble durability for laundry, when washed with this composition, and moreover, it can give the laundry an antistatic property, a resistivity to resoiling and a soil releasability of a prolonged duration.


**4 Claims, No Drawings**

# DETERGENT COMPOSITION

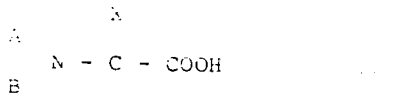
## CROSS REFERENCE TO RELATED APPLICATIONS

This is a division of my application Ser. No. 250,653, filed May 5, 1972.

## BACKGROUND OF THE INVENTION

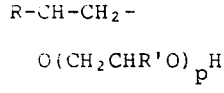
1. Field of the Invention:

This invention relates to a new detergent composition, and more particularly to a new detergent composition containing at least one of improved amphoteric surface active agenst represented by the general formula (I), or its organic amine salts, ammonium salts, alkali metal salts, non-alkali metal salts or their acid complex salts, and improved amphoteric surface active agents derived from a compound having the general formula (II) through treatment with an amphoterizing agent such as monochloroacetic, β-chloropropionic, γ-chlorobutyric and monochlorosuccinic acids, and their alkali-metal salts or esters, maleic anhydride, acrylic, or methacrylic acid ester, acrylonitrile or the like, thereby to form an amphoteric surface active agent, or its organic amine salts, ammonium salts, alkali metal salts, non-alkali metal salts, or their acid complex salts, as an active component:

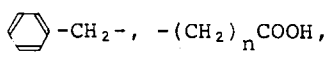


... (I)

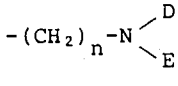
wherein A and B represent hydrogen atoms or groups



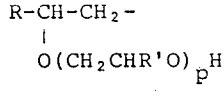
or $-(CH_2CHR'O)_qH$, (wherein R is a hydrocarbon group having 2 to 28 carbon atoms and R' is a hydrogen atom or a group $-CH_3$), X represents a hydrogen atom or a hydrocarbon group having 6 to 30 carbon atoms, Y represents a hydrogen atom, or a group $-CH_3$, $-CH_2CH(CH_3)CH_3$,



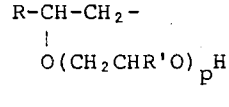
(wherein $n$ is an integer from 1 to 5),



(wherein D and E are hydrogen atoms or groups

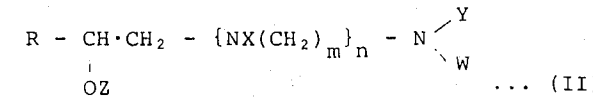


or $-(CH_2CHR'O)_qH$), $p$ and $q$ are integers from 0 to 50, and when X is a hydrogen atom, at least one of A, B, D and E is a group



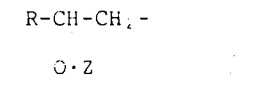


or when A, B and Y are all hydrogen atoms, X is the hydrocarbon group having 2 to 28 carbon atoms, or



... (II)

wherein R represents a hydrocarbon group of 4 to 30 carbon atoms, Z represents a hydrogen atom or a group $-(CH_2CHR'O)_pH$, (wherein R' is a hydrogen atom or a group $-CH_3$ and $p$ is an integer from 1 to 100), X, Y, and W represents hydrogen atoms or groups



or $-(CH_2CHR'O)_pH$), $m$ is an integer from 2 to 10, $n$ is an integer from 0 to 5, and X, Y, Z and W can take groups different from one another at the same time.

2. Description of the Prior Art

Generally, an ionic surface active agents such as linear alkylbenzenesulfonates, sodium salts of saturated linear alcohol sulfates or the like, and non-ionic surface active agents such as nonylphenol ethylene oxide adduct of the like, are used in washing of natural fibers and synthetic fibers. However, when such detergents are used, the fibers cleansed with such detergents have a deteriorated hand feel and the antistatic property of the fibers is lost. Therefore, it has been the usual practice to give the washed fibers an additional treatment with a soft-finishing agent or an antistatic agent. However, these properties which are thus added to the fibers disappear when the fibers are washed again. On the other hand, when the fibers are washed with a known detergent mixed with a soft-finishing agent and an antistatic agent, the individual effects of these mixed agents are not exhibited clearly, but rather they serve, in many cases, only to lower the activity of the detergent per se. Therefore, when the soft-finishing agent, antistatic agent or the like, are used, it is necessary to add these agents into a rinsing solution after cleansing or to subject the washed fibers to a separate treatment with these agents, and thus a great inconvenience is experienced.

Further, detergents prepared from petroleum or alcohol base used as a detergent for food ware or vegetable have an excellent detergency but have a property to damage skins. Thus, the use of the synthetic detergents has recently become a great problem. Furthermore, the biodegradability of a surface active agent blended in the synthetic detergent for washing, and the pollution by condensed phosphates have been recently regarded as the public pollution problem.

## SUMMARY OF THE INVENTION

The present invention has been accomplished to overcome these undesirable problems and provides a novel detergent composition having less skin irritativeness, and moreover a good biodegradability, and further the present detergent composition does not require so much builders such as condensed phosphates.

In the prior patent application of the present inventor for a detergent composition U.S. Ser. No. 168,413, it was disclosed that a water-insoluble metal salt of the amphoteric surface active agent of a long-chain imidaz-

oline type was dispersed and solubilized in a water system with an effective dispersant, and the resulting transparent solution was externally deposited and absorbed on the surfaces of the fibers. As a result of further studies, the present inventors have found that the similar effect can be attained by the present novel compounds.

The novel compounds of the present invention can be used alone as a detergent, or added to the known detergent as an additive to improve detergency, bubble formability and bubble durability and endow an antistatic property, resistibility to resoiling and soil releasability to a material to be washed. The present detergent composition can be regarded as a king of polymeric electrolytes or polymeric surface active agent. Therefore, its critical micelle formation concentration is very low, for example, about 1/100 to 1/1000 of that of alkylbenzenesulfonates. That is, the present detergent composition can exhibit a good surface activity at a very low concentration and shows a good detergency. Furthermore, a strong monolayer is formed on the surfaces of material to be washed through absorption, and can be stably retained on the surface even in the cleansing step or even after drying. Thus, the antistatic property and soil releasability can be endowed thereby to the materials to be washed for a considerably prolonged period of time. That is to say, the present detergent composition can be used along in the antistatic, anti-redeposition and soil release treatments.

As described above, the feature of the present detergent composition can be obtained without any failure even if it is added to the other conventional detergent composition, but particularly when the present composition is added to the conventional carpet shampoo consisting mainly of sodium alkylsulfates ester, very stable bubbles can be obtained. Furthermore, the carpet surface is not so much wetted as necessary, and the fouling components can be effectively absorbed onto the bubble interfaces, whereby an excellent carpet surface having a good antistatic property, good anti-soil property and a good soil releasability can be obtained.

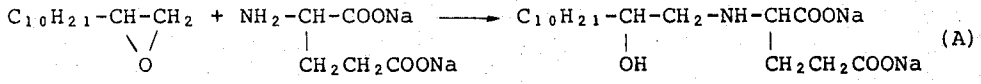
Moreover, the present amphoteric surface active agent has less skin irritativeness, but has an action to protect the skin. Therefore, it is useful as a detergent for food wares, vegetable or the like. Furthermore, the present amphoteric surface active agent has a germicidal action, an antibacterial action and a deodorizing action, and therefore can be used as a substrate for toilet soap, medical soap or toilet cleanser, or as a blending component for these compositions. The present surface active agent is used together with the conventional household detergent, industrial detergent, hair shampoo, carpet shampoo, syndet bar, soap, or the like. Furthermore, the present surface active agent can be used as an organic builder for detergents.

On the other hand, the present detergent composition has a wide use as an industrial detergent, for example, various detergents in the fiber industry, a detergent in the cleaning industry, a metal detergent, an automobile, ship or vehicle cleaner, or as a cleaner for plant or equipments in the food industry, or cleaner for food itself or as a cleaning agent and germicide for food container, or the like.

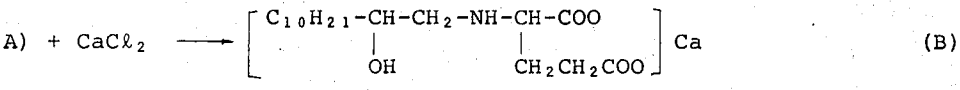
## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now, a process for producing a novel surface active agent used in the present invention will be outlined.

The compound as represented by the general formula (I) is obtained by adding 1,2-epoxyalkane or $\alpha$-olefin to a natural or synthetic $\alpha$-amino acid, or further by reacting ethylene oxide or propylene oxide with the resulting product. For example, a product (A) obtained by reacting disodium glutamate with 1,2-epoxydodecane in a solvent mixture of alcohol-water is double-decomposed with calcium chloride to a compound (B):

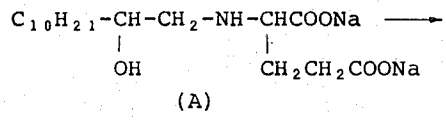


(A)

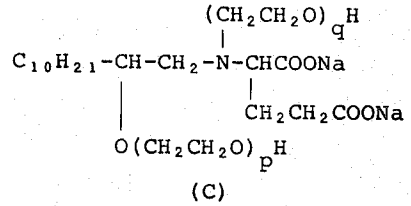


(B)

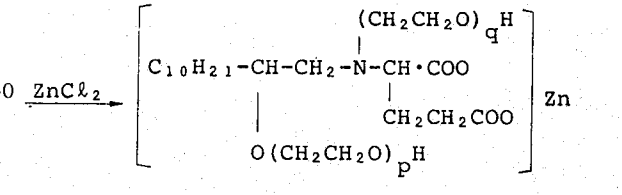
When 20 moles of ethylene oxide are added to one mole of the product (A), a compound (C) is obtained. When the compound (C) is double-decomposed with zinc chloride, a compound (D) is obtained:



(A)

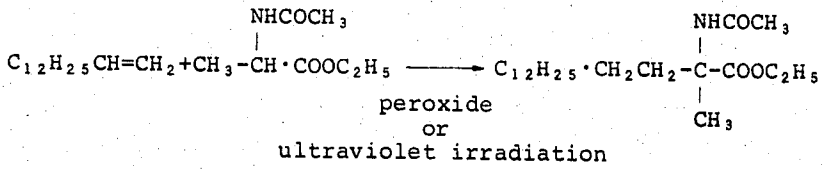


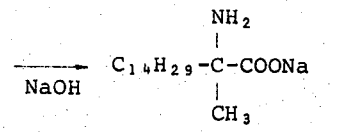
(C)



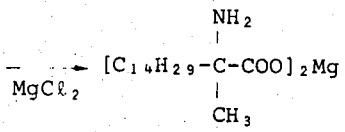
(p + q = 20) (D)

When an amino acid, whose amino and carboxyl groups are protected, for example, N-acetylalanine ethyl ester, and $\alpha$-tetradecene are subjected to radical addition reaction in the presence of a peroxide or under irradiation of ultraviolet rays. The protected amino group of the resulting product is released and further the product is saponified with sodium hydroxide, a sodium salt of $\alpha$-tetradecene-alanine adduct can be obtained. When the resulting sodium salt is double-decomposed with the corresponding inorganic metal salt, for example, magnesium chloride, a compound (E) is obtained.

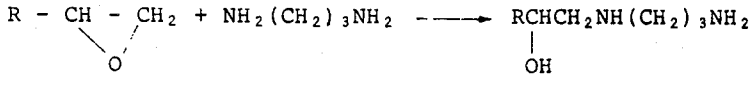


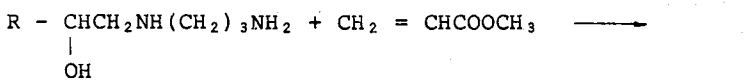


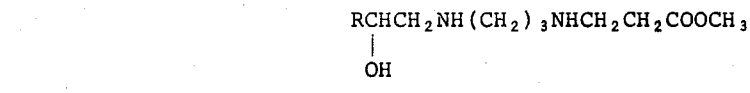
(E)

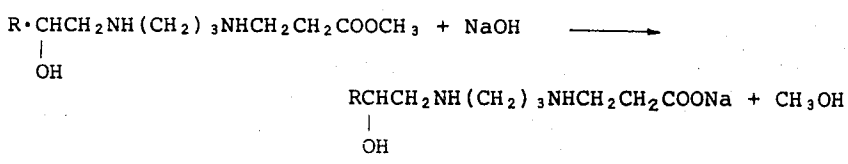


The compound as represented by the general formula (II) can be obtained, for example, by reacting 1,2-expoxyalkane with propylene diamine. The present amphoteric surface active agent can be obtained by reacting an amphoterizing agent, for example, methyl acrylate, with the resulting compound of the general formula (II). The resulting compound is further saponified with sodium hydroxide thereby to obtain a sodium salt of the amphoteric surface active agent, as shown below:



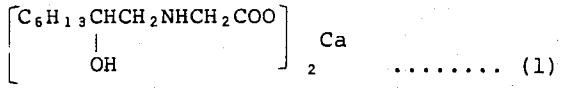




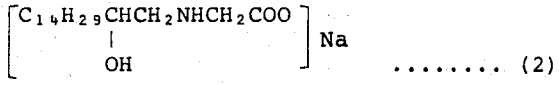


When ethylene oxide or propylene oxide is added to the resulting sodium salt, adducts containing various moles of ethylene oxide or propylene oxide can be obtained.

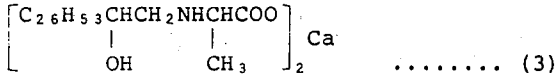
Examples of the amphoteric surface active agents having the formula (I) include the following compounds:



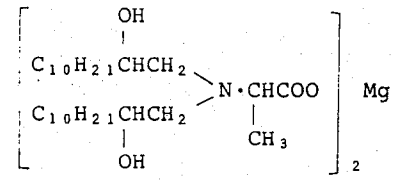
(1)



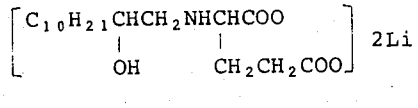
(2)



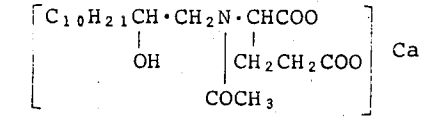
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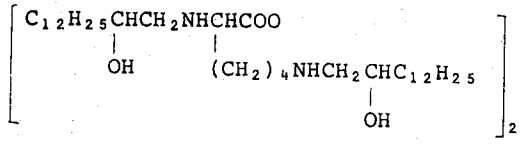
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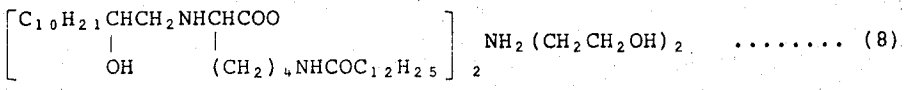
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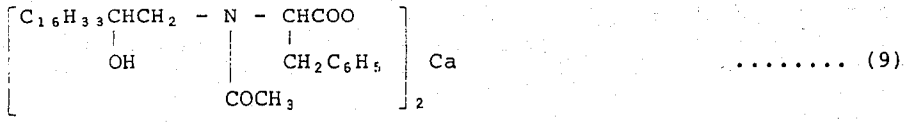
(6)



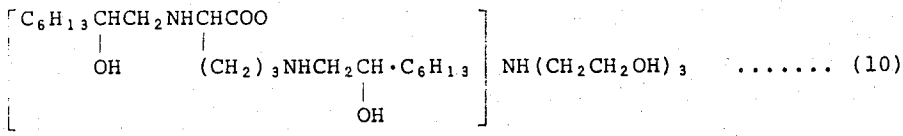
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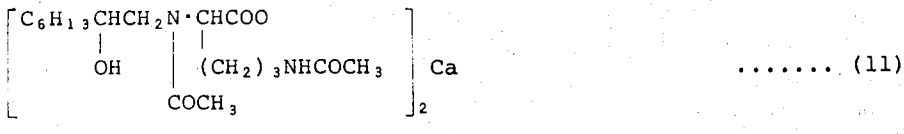
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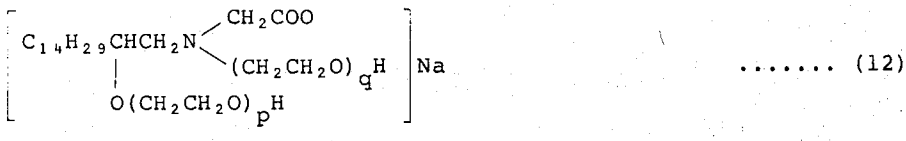
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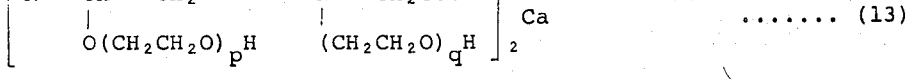


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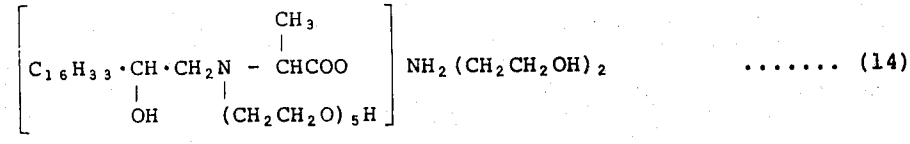
(p + q = 4)



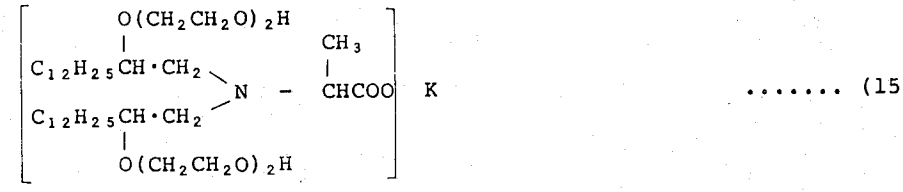
..... (13)

R: a mixture of $C_{18}H_{37}$ - $C_{26}H_{53}$

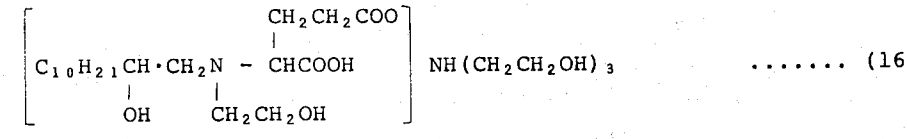
(p + q = 60)



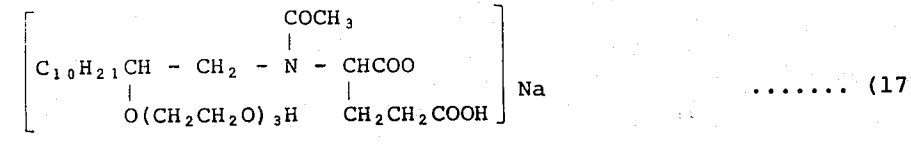
..... (14)



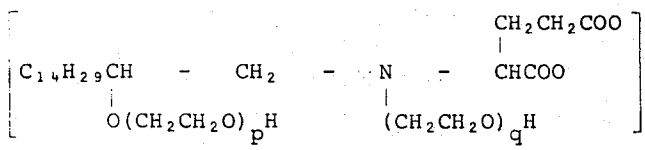
..... (15)



..... (16)

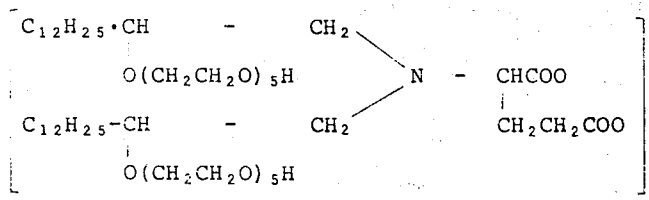


..... (17)

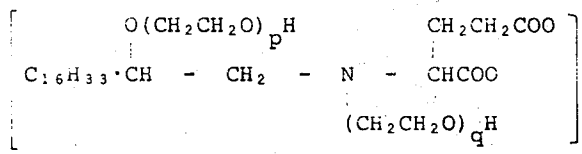


$Na_2$ ..... (18)

$(p + q = 20)$

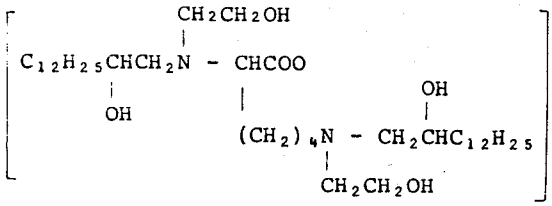


$Na_2$ ..... (19)

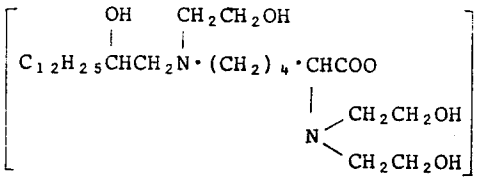


Ca ..... (20)

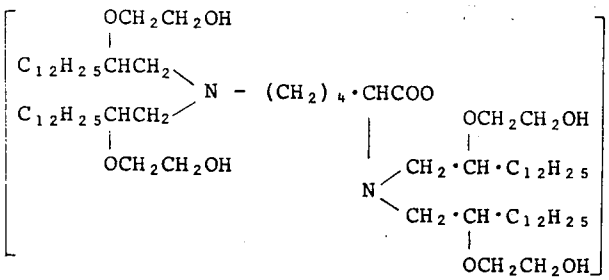
$(p + q = 40)$



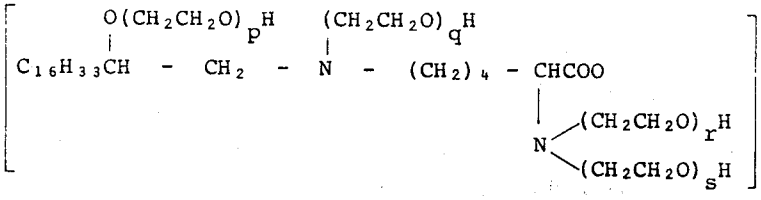
Na ..... (21)



Li ..... (22)

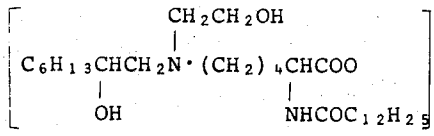


$NH_2(CH_2CH_2OH)_2$ (23)

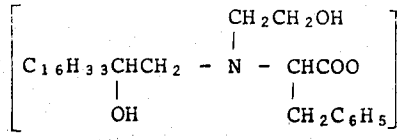


Ca (24)

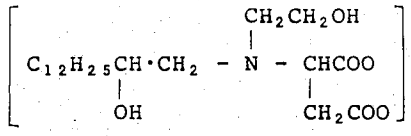
$(p + q + r + s = 40)$



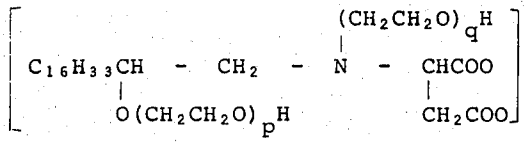
K ..... (25)



$NH_2(CH_2CH_2OH)_2$ ..... (26)

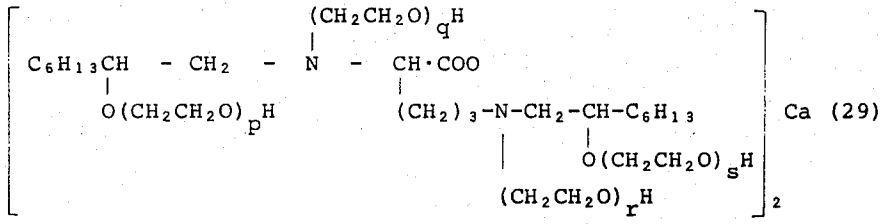


$K_2$ ..... (27)



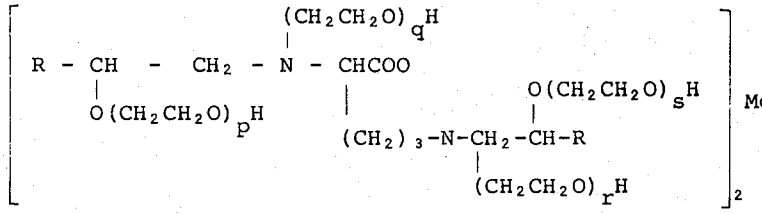
Ca ..... (28)

$(p + q = 30)$



Ca (29)

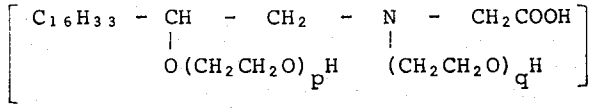
$(p + q + r + s = 8)$



Mg... (30)

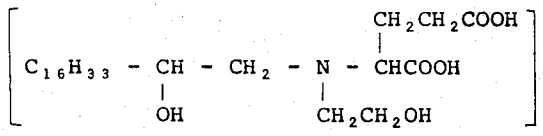
R: a mixture of $C_{18}H_{37} - C_{26}H_{53}$

$(p + q + r + s = 80)$

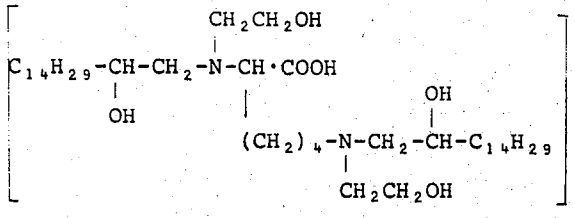


butyrate ..... (31)

$(p + q = 4)$



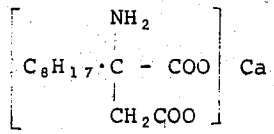
hydrochloride ..... (32)



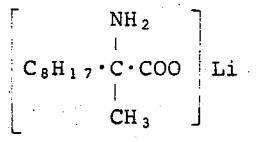
citrate ..... (33)



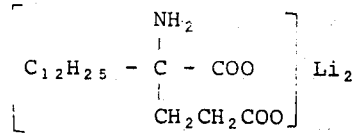
..... (34)



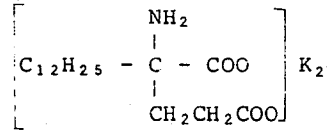
..... (35)



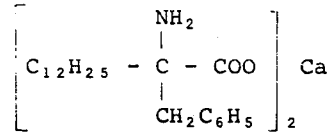
..... (36)



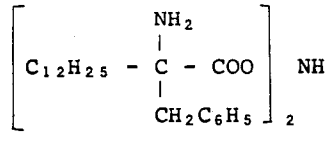
..... (37)



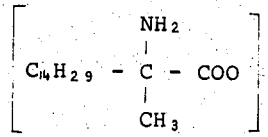
..... (38)



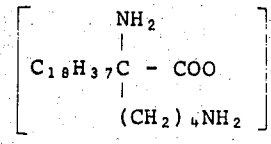
..... (39)



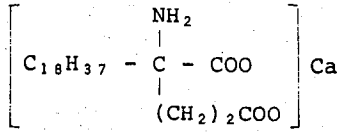
..... (40)



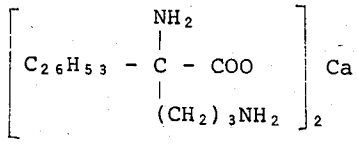
..... (41)



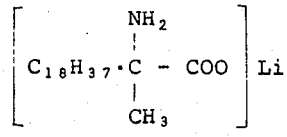
..... (42)



..... (43)

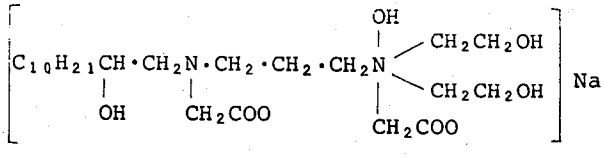


..... (44)

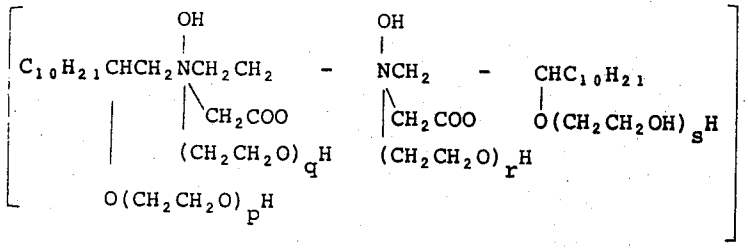


..... (45)

Examples of the amphoteric surface active agents derived from the compounds having the formula (II) include the following compounds:

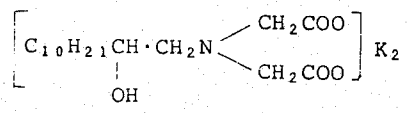


..... (46)

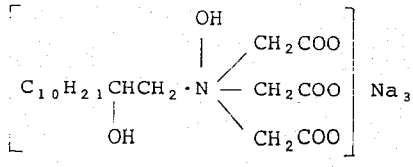


..... (47)

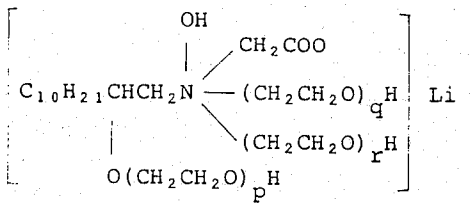
(p + q + r + s = 20)



..... (48)

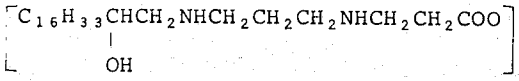


..... (49)

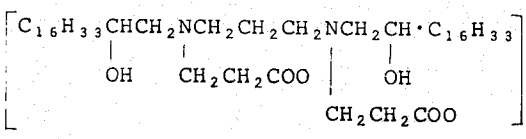


(p + q + r = 9)

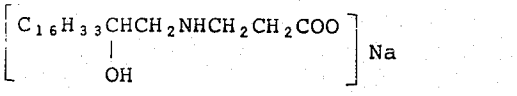
..... (50)



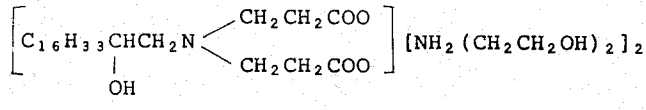
..... (51)



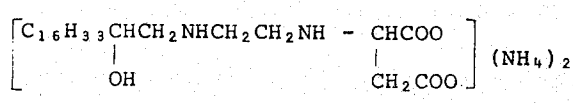
..... (52)



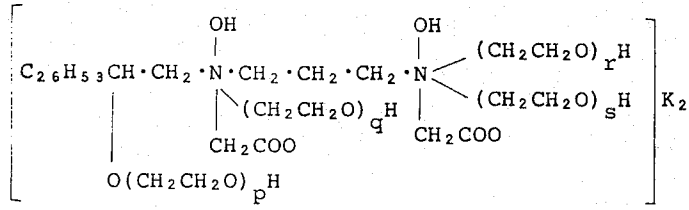
..... (53)



..... (54)



..... (55)



(p + q + r + s = 40)

..... (56)

Now, the present invention will be explained in detail, referring to Examples. In the Examples, "part" is by weight.

## EXAMPLE 1

Detergent compositions were prepared each from 10 parts of the present amphoteric surface active agent, 5 parts of sodium metasilicate, 8 parts of soda ash and 77 parts of Glauber's salt. These detergent compositions were charged each in a standard amount as the heavy duty detergent (0.165% by weight) into an electric washing machine filled with acrylic fibers (Vonnel, a

trademark of acrylic fibers made by Mitsubishi Rayon Co., Ltd., Japan) fouled by wearing, and subjected to washing according to the standard washing procedure. On the other hand, the acrylic fibers were washed likewise with a commercially available synthetic detergent and a commercially available soft-finishing agent. Detergency and hand feel of the washed fibers were determined visually or by touch. The results are shown in Table 1. It is evident from Table 1 that the present detergent compositions have an excellent detergency, even though the present detergent compositions contain less active components than those of the commercially available detergent, and contain no builder such as sodium tripolyphosphate, etc.

Table 1

| Compound No. | Detergency | Hand feel | Antistatic effect [Half time of leakage (sec.)] |
|---|---|---|---|
| 2 | Very good | Good | 2.1 |
| 5 | Very good | Good | 5.1 |
| 8 | Very good | Good | 3.6 |
| 10 | Very good | Good | 3.7 |
| 12 | Very good | Good | 2.8 |
| 13 | Very good | Good | 3.0 |
| 14 | Very good | Good | 2.8 |
| 15 | Very good | Good | 3.5 |
| 16 | Very good | Good | 3.7 |
| 17 | Very good | Good | 3.2 |
| 18 | Very good | Good | 3.5 |
| 19 | Very good | Good | 4.7 |
| 20 | Very good | Good | 4.0 |
| 21 | Very good | Good | 2.8 |
| 22 | Very good | Good | 2.5 |
| 23 | Very good | Good | 3.0 |
| 24 | Very good | Good | 3.5 |
| 25 | Very good | Good | 3.7 |
| 26 | Very good | Good | 4.0 |
| 27 | Very good | Good | 4.2 |
| 28 | Very good | Good | 4.0 |
| 29 | Very good | Good | 4.2 |
| 30 | Very good | Good | 2.8 |
| 36 | Very good | Good | 3.2 |
| 37 | Very good | Good | 4.1 |
| 38 | Very good | Good | 3.7 |
| 40 | Very good | Good | 4.4 |
| 44 | Very good | Good | 7.6 |
| 46 | Very good | Good | 4.8 |
| 47 | Very good | Good | 4.2 |
| 48 | Very good | Good | 5.0 |
| 49 | Very good | Good | 3.5 |
| 50 | Very good | Good | 3.7 |
| 51 | Very good | Good | 4.0 |
| 52 | Very good | Good | 2.8 |
| 53 | Very good | Good | 3.6 |
| 54 | Very good | Good | 2.9 |
| 55 | Very good | Good | 3.5 |
| 56 | Very good | Good | 3.7 |
| Commercial heavy duty detergent | Very good | Poor | ∞ |

## EXAMPLE 2

Five parts of the present surfactant was added to a commercial heavy duty detergent composition consisting, for example, of 25 parts of sodium linear alkylbenzenesulfonate (LAS), 25 parts of sodium tripolyphosphate, 5 parts of sodium metasilicate, 5 parts of soda ash and 40 parts of Glauber's salt, while the amount of LAS was reduced to 20 parts, whereby detergent compositions were prepared. Fouled polyester sheets were washed according to the standard washing procedure, using the respective detergent composition in a standard amount as the heavy duty detergent (0.165% by weight). The results are shown in Table 2. As shown in Table 2, the washed shirts had a good hand feel with an excellent detergency in the case of the present detergent compositions. Further, cleansing could be carried out more easily by blending the present surfactant in the detergent composition.

Table 2

| Compound No. | Detergency | Hand feel | Antistatic effect [Half time of leakage (sec.)] |
|---|---|---|---|
| 1 | Very good | Good | 2.5 |
| 2 | Very good | Good | 2.5 |
| 3 | Very good | Good | 3.0 |
| 4 | Very good | Good | 3.5 |
| 5 | Very good | Good | 5.6 |
| 6 | Very good | Good | 2.0 |
| 7 | Very good | Good | 3.8 |
| 8 | Very good | Good | 4.0 |
| 9 | Very good | Good | 4.0 |
| 10 | Very good | Good | 4.1 |
| 11 | Very good | Good | 3.5 |
| 12 | Very good | Good | 1.8 |
| 13 | Very good | Good | 2.7 |
| 14 | Very good | Good | 5.0 |
| 15 | Very good | Good | 4.5 |
| 16 | Very good | Good | 4.0 |
| 17 | Very good | Good | 3.7 |
| 18 | Very good | Good | 3.0 |
| 19 | Very good | Good | 4.2 |
| 20 | Very good | Good | 4.0 |
| 21 | Very good | Good | 4.7 |
| 22 | Very good | Good | 3.5 |
| 23 | Very good | Good | 4.2 |
| 24 | Very good | Good | 2.8 |
| 25 | Very good | Good | 5.6 |
| 26 | Very good | Good | 4.5 |
| 27 | Very good | Good | 4.5 |
| 28 | Very good | Good | 5.0 |
| 29 | Very good | Good | 3.7 |
| 30 | Very good | Good | 3.5 |
| 31 | Very good | Good | 4.2 |
| 32 | Very good | Good | 4.5 |
| 33 | Very good | Good | 5.0 |
| 34 | Very good | Good | 3.7 |
| 35 | Very good | Good | 3.0 |
| 36 | Very good | Good | 3.6 |
| 37 | Very good | Good | 4.2 |
| 38 | Very good | Good | 4.3 |
| 39 | Very good | Good | 2.8 |
| 40 | Very good | Good | 4.4 |
| 41 | Very good | Good | 5.0 |
| 42 | Very good | Good | 3.7 |
| 43 | Very good | Good | 5.0 |
| 44 | Very good | Good | 7.8 |
| 45 | Very good | Good | 5.4 |
| 46 | Very good | Good | 3.5 |
| 47 | Very good | Good | 3.0 |
| 48 | Very good | Good | 3.8 |
| 49 | Very good | Good | 2.8 |
| 50 | Very good | Good | 3.0 |
| 51 | Very good | Good | 4.2 |
| 52 | Very good | Good | 3.5 |
| 53 | Very good | Good | 3.0 |
| 54 | Very good | Good | 4.2 |
| 55 | Very good | Good | 3.7 |
| 56 | Very good | Good | 3.0 |
| Commercial heavy duty detergent (control) | Very good | Poor | ∞ |

## EXAMPLE 3

Two % by weight of the present surfactant was added to a hair shampoo composition consisting, for example, of 10 parts of lauryl sulfate triethanolamine, 2 parts of lauroyldiethanolamide, 8 parts of urea, 3 parts of sodium salt of lauryl alcohol ether sulfate (3 moles) and 76 parts of water to prepare hair shampoo. Women's hair was washed with the thus prepared hair shampoo according to the conventional procedure. The results are shown in Table 3. It is seen that the detergency and bubble stability are improved by blending the present surfactant to the conventional shampoo composition, and the good hand feel can be endowed to the hair after washing and drying.

Table 3

| Compound No. | Static frictional coefficient | Hand feel | Bubble stability |
|---|---|---|---|
| 12 | 0.202 | Soft | Good |
| 13 | 0.195 | Soft | Good |
| 14 | 0.200 | Soft | Good |
| 15 | 0.193 | Soft | Good |
| 19 | 0.199 | Soft | Good |
| 21 | 0.210 | Soft | Good |
| 23 | 0.190 | Soft | Good |
| 25 | 0.211 | Soft | Good |
| 26 | 0.210 | Soft | Good |
| 38 | 0.194 | Soft | Good |
| 46 | 0.204 | Soft | Good |
| 47 | 0.210 | Soft | Good |
| 48 | 0.195 | Soft | Good |
| 49 | 0.206 | Soft | Good |
| 50 | 0.202 | Soft | Good |
| 51 | 0.200 | Soft | Good |
| 52 | 0.198 | Soft | Good |
| 53 | 0.208 | Soft | Good |
| 54 | 0.202 | Soft | Good |
| 55 | 0.200 | Soft | Good |
| 56 | 0.198 | Soft | Good |
| Commercial shampoo (control) | 0.230 | Rigid | Fair |

## EXAMPLE 4

0.2 parts of the present surfactant was added to a carpet detergent consisting of 0.5 parts of sodium salt of lauryl sulfate, 0.15 parts of lauroyldiethanolamide and 99.35 parts of water, while reducing the amount of the sodium salt of lauryl sulfate to 0.3 parts thereby to prepare carpet detergent compositions. Fouled beige nylon carpets were washed with the thus prepared detergent compositions according to the conventional carpet washing procedure comprising bubbling, brushing, leaving at a standstill and suction under vacuum. The results are shown in Table 4. It is obvious that the carpet detergent composition has an improved detergency and bubble stability and faster drying by blending the present surfactant into the conventional detergent composition, and an antistatic property can be endowed to the carpets after washing.

Table 4

| Compound No. | Soil releasability | Wetting of the carpet right after washing | Antistatic effect [Half time of leakage (sec.)] |
|---|---|---|---|
| 12 | Good | Feeling of dryness, faster drying | 0.5 |
| 14 | Good | Feeling of dryness, faster drying | 0.6 |
| 15 | Good | Feeling of dryness, faster drying | 1.0 |
| 17 | Good | Feeling of dryness, faster drying | 1.6 |
| 18 | Good | Feeling of dryness, faster drying | 1.5 |
| 20 | Good | Feeling of dryness, faster drying | 1.4 |
| 22 | Good | Feeling of dryness, faster drying | 0.3 |
| 23 | Good | Feeling of dryness, faster drying | 1.8 |
| 26 | Good | Feeling of dryness, faster drying | 1.2 |
| 27 | Good | Feeling of dryness, faster drying | 0.1 |
| 28 | Good | Feeling of dryness, faster drying | 0.1 |
| 29 | Good | Feeling of dryness, faster drying | 1.4 |
| 38 | Good | Feeling of dryness, faster drying | 0.1 |
| 46 | Good | Feeling of dryness, faster drying | 0.8 |
| 47 | Good | Feeling of dryness, faster drying | 0.3 |
| 48 | Good | Feeling of dryness, faster drying | 0.7 |
| 49 | Good | Feeling of dryness, faster drying | 1.0 |
| 50 | Good | Feeling of dryness, faster drying | 0.8 |
| 51 | Good | Feeling of dryness, faster drying | 0.8 |
| 52 | Good | Feeling of dryness, faster drying | 1.2 |
| 53 | Good | Feeling of dryness, faster drying | 1.0 |
| 54 | Good | Feeling of dryness, faster drying | 0.8 |
| 55 | Good | Feeling of dryness, faster drying | 0.8 |
| 56 | Good | Feeling of dryness, faster drying | 1.0 |
| Commercial carpet shampoo (control) | Foulings remain | Wettish feeling | ∞ |

## EXAMPLE 5

Ten parts of the present surfactants 12, 18 and 21 were added each to the detergent for food wares and vegetable having the following composition, while reducing the amount of LAS to 10 parts, thereby to prepare detergent compositions for food wares and vegetable. The thus prepared detergent compositions were

tested by 10 household wives for 1 month in the winter season (February), and it was found that the detergent compositions had a very good detergency and gave no irritation to hands, as compared with the controls.

| | |
|---|---|
| Sodium linear alkylbenzenesulfonate (LAS) | 20 parts |
| Amisol CD (a product of Kawakami Fine Chemicals, Co., Japan) | 2 parts |
| Urea | 6 parts |
| Lanolin alcohol-ethylene oxide (50 moles) adduct | 0.2 parts |
| Water | 71.8 parts |

## EXAMPLE 6

Glass cleaners having the following composition were prepared, and glass was washed with the thus prepared compositions. In that case, the present surfactants 14, 16, 18, 19, 21, 22, 23, 27, 30, 32 and 33 were used. It was found that the compositions had a good detergency, and a lustrous glass surface was obtained after the washing.

| | |
|---|---|
| Present surfactant | 0.025% by weight |
| Higher alcohol-ethylene oxide (9 moles) adduct | 0.25 % by weight |
| Amisol CD (a product of Kawakami Fine Chemicals, Co., Japan) | 0.50 % by weight |
| Isopropyl alcohol | 5.0 % by weight |
| Water | 94.225% by weight |

Refrigerators and food ware shelves were washed with the said detergent compositions, and it was found that the present detergent compositions had a strong detergency without damaging the plastic surface and painted surface, and a lustrous clean surface was obtained.

## EXAMPLE 7

Ten parts of the present surfactant having the general formula I and 3 parts of the present surfactant derived from the compounds having the general formula II were melted, and 87 parts of hot water was added little by little with stirring thereto to dilute the surfactants. The resulting solution was passed through a homogenizer at 80°C, and then to the normal temperature, whereby the detergent composition were obtained. The thus obtained detergent compositions were subjected to detergency tests in the same method as described in Example 1. The results are shown in Table 5.

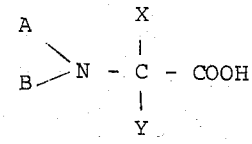
The present compositions had a good detergency and endow a good hand feel and antistatic effect.

Table 5

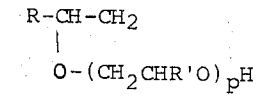
| Compound No. | Detergency | Hand feel | Antistatic effect [Half time of leakage (sec.)] |
|---|---|---|---|
| 1 + 46 | Good | Good | 1.5 |
| 7 + 47 | Good | Good | 1.0 |
| 11 + 48 | Good | Good | 1.6 |
| 16 + 49 | Good | Good | 1.8 |
| 19 + 50 | Good | Good | 0.9 |
| 24 + 51 | Good | Good | 0.8 |
| 28 + 52 | Good | Good | 1.5 |
| 30 + 53 | Good | Good | 2.3 |
| 35 + 54 | Good | Good | 3.0 |
| 40 + 55 | Good | Good | 2.7 |
| 44 + 56 | Good | Good | 1.7 |
| Commercial available detergent (control) | Good | Poor | ∞ |

I claim:

**1.** A detergent composition consisting essentially of at least one surface active agent as the active component of the formula:



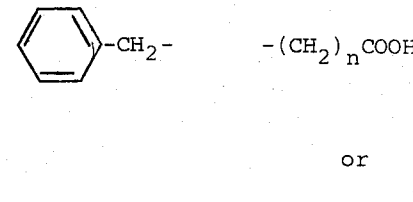
wherein either A or B is hydrogen and A and B are independently



$-(CH_2CHR'O)_qH$ or $-COCH_3$

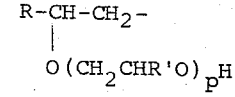
wherein R is an alkyl radical of 6 to 28 carbon atoms, R′ is hydrogen or methyl, and $p$ and $q$ are independently integers from 0 to 50;

X is hydrogen or an alkyl radical of 6 to 28 carbon atoms; Y is hydrogen, methyl, $-CH_2CH(CH_3)CH_3$,



where n is an integer from 1 to 5, and

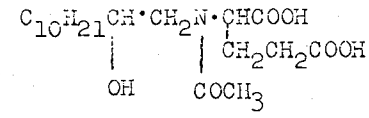
D and E are independently A and B; provided that when X is hydrogen, at least one of A, B, D and E is



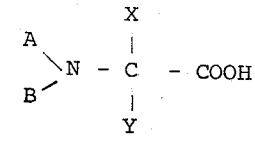
and salts thereof.

**2.** A detergent composition comprising the detergent of claim **1** blended with at least one detergent builder.

**3.** The detergent composition according to claim **1** wherein the surface active agent has the formula:



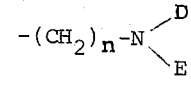
**4.** A detergent composition consisting essentially of at least one surface active agent as the active component of the formula:



wherein A and B are both hydrogen,

X is hydrogen or an alkyl radical of 6 to 28 carbon atoms;

Y is $-(CH_2)_nCOOH$ or



where $n$ is an integer from 1 to 5, and
D and E are independently A and B;
provided that when X is hydrogen at least one of D or E is

$$R-CH-CH_2-$$
$$|$$
$$O(CH_2CHR'O)_pH$$

and the salts thereof.

* * * * *