

COMPOSITIONS COMPRISING SULFONATED ESTOLIDES AND ALKYL ESTER SULFONATES, METHODS OF MAKING THEM, AND COMPOSITIONS AND PROCESSES EMPLOYING THEM

RELATED APPLICATIONS

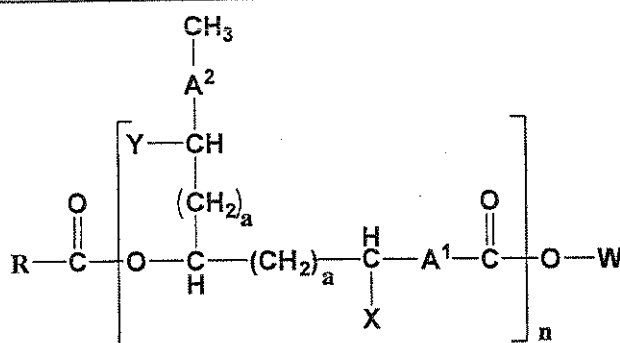
[001] This application claims priority from European Application No. 09009490.5, filed July 22, 2009 entitled “Sulfonated Estolides And Other Derivatives Of Fatty Acids, Methods Of Making Them, And Compositions And Processes Employing Them”, the complete subject matter of which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

[002] The present technology, in general, relates to compositions comprising sulfo-estolides and alkyl ester sulfonates. More particularly, the present technology relates to compositions comprising sulfo-estolides derivatives and salts of sulfo-estolides, and methyl ester sulfonates.

BRIEF SUMMARY OF THE INVENTION

[002a] In one aspect, the present technology provides a laundry detergent composition, comprising: at least one compound having the following general Formula 1:



wherein n is an integer from 1-30 or a mixture thereof;

one of X and Y is SO₃-Z, the other of X and Y is H (i. e., a hydrogen atom), and X and Y are independently assigned in each repeating unit;

A¹ and A² are linear or branched, saturated or unsaturated, substituted or un-substituted, alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is linear or branched, saturated or unsaturated, substituted or un-substituted hydrocarbon wherein the total number of carbon atoms is from 1 to 24;

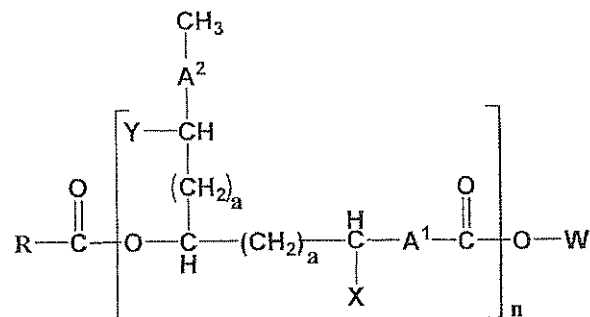
W is a monovalent or divalent metal cation, ammonium cation, substituted ammonium cation, H, or an alkyl or substituted alkyl group;

Z is H, or a monovalent or divalent metal cation, ammonium or substituted ammonium cation;

at least one alkyl ester sulfonate;

wherein the composition has a pH value in the range of 7 to 10.

[003] In at least one example aspect, the present technology provides a composition comprising one or more alkyl ester sulfonates and one or more compounds having the following general Formula 1:



wherein n is an integer from about 1 to about 30, alternatively about 1 to about 10, alternatively 1 to 4, alternatively 1, 2, or 3, alternatively 1 or 2, alternatively 1; or mixtures thereof; one of X and Y is SO₃-Z, the other of X and Y is H (i.e., a hydrogen atom), and X and Y are independently assigned in each repeating unit; A¹ and A² are linear or branched, saturated or unsaturated, substituted or un-substituted, alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂; a is 0, 1, or 2, and is independently assigned in each repeating unit; R is linear or branched,

saturated or unsaturated, substituted or un-substituted hydrocarbon wherein the total number of carbon atoms is from about 1 to about 24; W is a monovalent or divalent metal cation, ammonium cation, substituted ammonium cation, H, or an alkyl or substituted alkyl group; and Z is H, or a monovalent or divalent metal cation, ammonium or substituted ammonium cation.

[004] In another example aspect, the present technology provides a method of laundering fabrics using one or more compositions of the presently described technology herein comprising the steps of placing one or more fabric articles to be laundered in a high efficiency or regular washing machine; placing a sufficient amount of one or more compositions of the present technology in the high efficiency or regular washing machine to provide a concentration of the composition in water of from about 0.001% by weight to about 5% by weight when the high efficiency washing machine is operated in a wash cycle; and actuating the wash cycle of the high efficiency or regular washing machine to launder the one or more fabric articles.

[005] In a still further example aspect, the present technology provides a method for hand laundering fabrics using one or more compositions of the presently described technology herein comprising the steps of placing one or more fabric articles to be hand laundered into a receptacle containing water; placing a sufficient amount of one or more composition of the present technology into the receptacle to provide a concentration of the composition in water of from about 0.001% by weight to about 5% by weight; and hand washing the fabric article in the receptacle to launder the fabric article.

[006] In at least one other example aspect, the present technology provides a method for laundering one or more fabric articles using at least one composition of the presently described technology herein, comprising the steps of placing one or more fabric articles to be laundered in a high efficiency or regular washing machine that uses a washing medium to launder clothes; providing the composition comprising from about 1% to about 99% by weight, alternatively from about 2% to about 90% by weight, of a sulfo-estolide and from about 2% to about 50% by weight of an alkyl ester sulfonate; placing in the high efficiency or regular loading washing machine a sufficient amount of the at least one compositions of the present technology to provide a concentration of the composition in the washing medium of from about 0.001% by weight to about 5% by weight when the machine is operated in a wash cycle; and actuating the wash cycle of the high efficiency or regular washing machine to launder the one or more fabric articles.

[007] In at least one additional example aspect, the present technology provides a method of reducing the viscosity of at least one composition comprising at least one surfactant in water, the method comprising the step of including in the at least one composition a sufficient amount of one or more compounds according to Formula 1 (described above), or mixtures thereof, effective to reduce the viscosity of the composition.

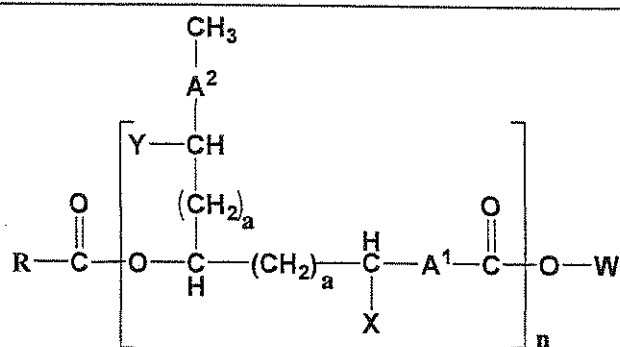
[008] Further, at least one example aspect of the present technology provides at least one surfactant composition comprising at least one surfactant, water, and an amount of one or more compositions of the present technology described herein, or mixtures thereof, effective to reduce the viscosity of the surfactant composition.

[009] In addition, another example aspect of the present technology provides a method of reducing the foam production of at least one composition comprising at least one surfactant in water, the method comprising the step of including in the composition an amount of one or more compositions of the presently described technology effective to reduce the foam production of the composition.

[010] Furthermore, in another example aspect, the present technology provides at least one surfactant composition comprising one or more surfactants, water, and a sufficient amount of one or more compositions of the presently described technology herein, effective to reduce the foam production of the surfactant composition.

[011] Interestingly, the present technology also provides in a still further example aspect, a method of cleaning at least one substrate, comprising the steps of providing at least one composition comprising a first surfactant comprising one or more compounds according to Formula 1, and a second surfactant comprising at least one anionic, cationic, nonionic, ampholytic, zwitterionic surfactant or combinations thereof; contacting a soiled substrate with the composition; and removing the composition and soil from the substrate.

[0011a] In another example, the present technology provides a laundry detergent composition, comprising: 2% to 90% by weight of one or more compounds having the following general Formula 1:



wherein n is an integer from 1-30 or a mixture thereof;

one of X and Y is SO₃-Z, the other of X and Y is H, and X and Y are independently assigned in each repeating unit;

A¹ and A² are linear or branched, saturated or unsaturated, substituted or unsubstituted alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is a linear or branched, saturated or unsaturated, substituted or unsubstituted alkyl radical with from 1 to 24 carbon atoms;

W is a monovalent or divalent metal cation, ammonium or substituted ammonium cation, H, or an alkyl or substituted alkyl group;

Z is H, or a monovalent or divalent metal cation, ammonium or substituted ammonium cation;

0.1% to 30% by weight of at least one alkyl ester sulfonate;

2% to 40% by weight of at least one nonionic surfactant;

0% to 32% by weight of at least one alcohol ether sulfate;

0% to 6% by weight of lauryl dimethylamine oxide;

0% to 6% by weight of C₁₂EO₃;

0% to 10% by weight of coconut fatty acid;

0% to 3% by weight of borax pentahydrate;

0% to 6% by weight of propylene glycol;

0% to 10% by weight of sodium citrate;

0% to 6% by weight of triethanolamine;

0% to 6% by weight of monoethanolamine;

0% to 1% by weight of at least one fluorescent whitening agent;

0% to 1.5% by weight of at least one anti-redeposition agent;

0% to 2% by weight of at least one thickener;

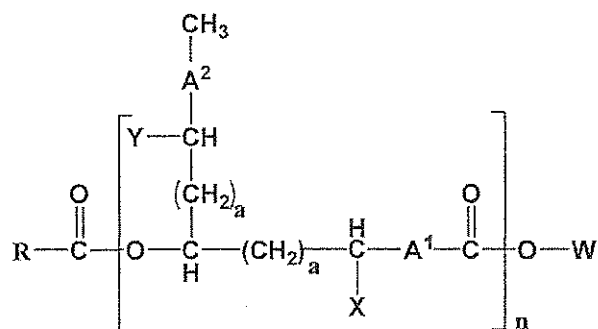
0% to 2% by weight of at least one thinner;

0% to 2% by weight of at least one protease;

0% to 2% by weight of at least one amylase; and

0% to 2% by weight of at least one cellulase.

[012] As a still further example aspect, the present technology provides a laundry detergent composition, comprising from about 5% to about 90% by weight of at least one compound according to general Formula 1:

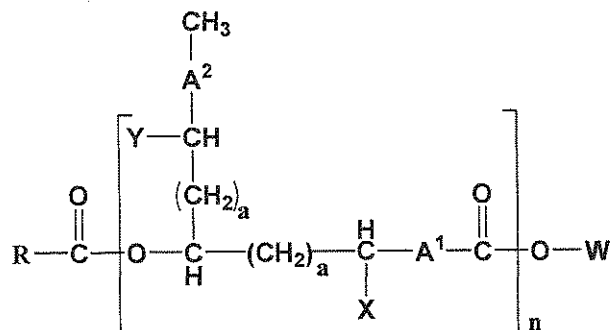


wherein n is an integer from about 1 to about 30, alternatively about 1 to about 10, alternatively 1 to 4, alternatively 1, 2, or 3, alternatively 1 or 2, alternatively 1; or mixtures thereof; one of X and Y is $\text{SO}_3\text{-Z}$, the other of X and Y is H , and X and Y are independently assigned in each repeating unit; A^1 and A^2 are linear or branched, saturated or unsaturated, substituted or un-substituted, alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C_8 to C_{22} ; a is 0, 1, or 2, and is independently assigned in each repeating unit; R is linear or branched, saturated or unsaturated, substituted or un-substituted hydrocarbon wherein the total number of carbon atoms is from 1 to about 24; W is a monovalent or divalent metal cation, ammonium cation, substituted ammonium cation, H , or an alkyl or substituted alkyl group; Z is H , or a monovalent or divalent metal cation, ammonium or substituted ammonium cation; and from 4% to about 50% by weight of at least one alkyl ester sulfonate (for example, a C_{16} alpha methyl ester sulfonate, a C_{12} alpha methyl ester sulfonate, or a blend of $\text{C}_{12}\text{-C}_{18}$ alpha methyl ester sulfonates); from 0% to about 25% by weight of cocamide diethanolamine, and wherein the composition has a pH value in the range of about 7 to about 10.

[013] Additionally, another example aspect of the present technology provides a laundry detergent composition, comprising from about 2% to about 90% by weight of one or more compounds according to general Formula 1 (described above); from 2% to 40% by weight of at least one nonionic surfactant; from 0% to 32% by weight of at least one alcohol ether sulfate; from 0.1% to 30% by weight of at least one alkyl ester sulfonate (for example, a C_{16} alpha methyl ester sulfonate, a C_{12} alpha methyl ester sulfonate, or a blend of $\text{C}_{12}\text{-C}_{18}$ alpha methyl ester sulfonates); from 0% to 6% by weight of lauryl dimethylamine oxide; from 0% to 6% by weight of C_{12}EO_3 ; from 0% to 10% by weight of coconut fatty acid; from 0% to 3% by weight of borax pentahydrate; from 0% to 6% by weight of propylene glycol; from 0% to 10% by weight of sodium citrate; from 0% to 6% by weight of triethanolamine; from 0% to 6% by weight of monoethanolamine; from 0% to 1% by weight of at least one fluorescent whitening agent; from 0% to 1.5% by weight of at least one anti-redeposition agent; from 0%

to 2% by weight of at least one thickener; from 0% to 2% by weight of at least one thinner; from 0% to 2% by weight of at least one protease; from 0% to 2% by weight of at least one amylase; and from 0% to 2% by weight of at least one cellulase.

[013a] In another aspect, the present technology provides a green laundry detergent composition, comprising: 2% to 90% by weight of one or more compounds having the following general Formula 1:



wherein n is an integer from 1-30 or a mixture thereof;

one of X and Y is SO₃-Z, the other of X and Y is H, and X and Y are independently assigned in each repeating unit;

A¹ and A² are linear or branched, saturated or unsaturated, substituted or unsubstituted alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is a linear or branched, saturated or unsaturated, substituted or unsubstituted alkyl radical with from 1 to 24 carbon atoms;

W is a monovalent or divalent metal cation, ammonium or substituted ammonium cation, H, or an alkyl or substituted alkyl group;

Z is H, or a monovalent or divalent metal cation, ammonium or substituted ammonium cation;

0.1% to 30% by weight of at least one alkyl ester sulfonate;

0% to 30% by weight of sodium lauryl sulfate;

0% to 30% by weight of sodium stearoyl lactylate;

0% to 30% by weight of sodium lauroyl lactate;

0% to 60% by weight of alkyl polyglucoside;

0% to 60% by weight of polyglycerol monoalkylate;

0% to 30% by weight of lauryl lactyl lactate;

0% to 30% by weight of saponin;

0% to 30% by weight of rhamnolipid;

0% to 30% by weight of sphingolipid;

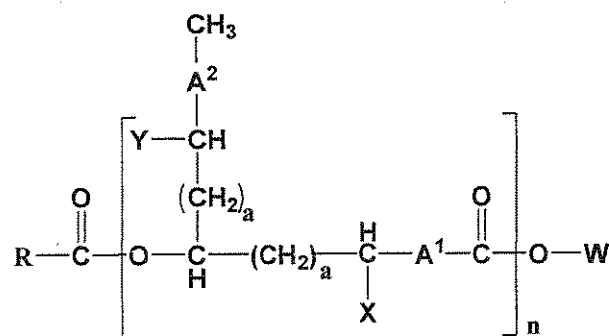
0% to 30% by weight of glycolipid;

0% to 30% by weight of at least one abietic acid derivative; and

0% to 30% by weight of at least one polypeptide.

[013b] In another aspect, the present technology provides a green laundry detergent composition, comprising: 2% to 99.9% by weight of one or more compounds having the following general Formula 1:

Formula 1



wherein n is an integer from 1-30 or mixture thereof;

one of X and Y is SO₃-Z, the other of X and Y is H, and X and Y are independently assigned in each repeating unit;

A¹ and A² are linear or branched, saturated or unsaturated, substituted or unsubstituted alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is a linear or branched, saturated or unsaturated, substituted or unsubstituted alkyl radical with from 1 to 24 carbon atoms;

W is a monovalent or divalent metal cation, ammonium or substituted ammonium cation, H, or an alkyl or substituted alkyl group;

Z is H, or a monovalent or divalent metal cation, ammonium or substituted ammonium cation;

0.1% to 30% by weight of at least one alkyl ester sulfonate;

0.5% to 3% by weight of magnesium sulfate;

0% to 30% by weight of sodium lauryl sulfate;

0% to 30% by weight of sodium stearyl lactylate;

0% to 30% by weight of sodium lauroyl lactate;

0% to 60% by weight of alkyl polyglucoside;

0% to 60% by weight of polyglycerol monoalkylate;

0% to 30% by weight of lauryl lactyl lactate;

0% to 30% by weight of saponin;

0% to 30% by weight of rhamnolipid;

0% to 30% by weight of sphingolipid;

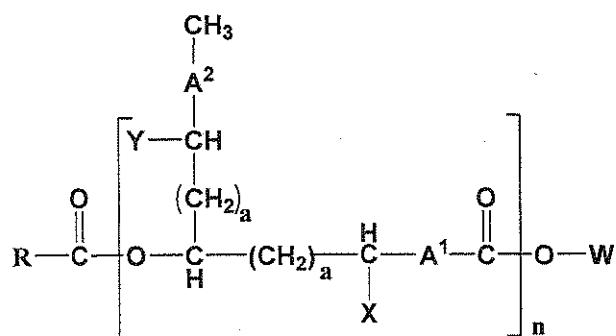
0% to 30% by weight of glycolipid;

0% to 30% by weight of at least one abietic acid derivative; and

0% to 30% by weight of at least one polypeptide.

[014] Another example aspect of the present technology provides a green laundry detergent composition, comprising from about 2% to about 90% by weight of one or more compounds according to general Formula 1; and from 0.1% to about 30% by weight of at least one alkyl ester sulfonate (for example, a C₁₆ methyl ester sulfonate or a blend of C₁₂-C₁₈ alpha methyl ester sulfonates); from 0% to about 30% by weight of at least one C₁₂ methyl ester sulfonate; from 0% to about 30% by weight of sodium lauryl sulfate; from 0% to about 30% by weight of Sodium stearyl lactylate; from 0% to about 30% by weight of sodium lauroyl lactate; from 0% to about 60% by weight of alkyl polyglucoside; from 0% to about 60% by weight of polyglycerol monoalkylate; from 0% to about 30% by weight of lauryl lactyl lactate; from 0% to about 30% by weight of saponin; from 0% to about 30% by weight of rhamnolipid; from 0% to about 30% by weight of sphingolipid; from 0% to about 30% by weight of glycolipid; from 0% to about 30% by weight of at least one abietic acid derivative; and from 0% to about 30% by weight of at least one polypeptide.

[014a] In yet another aspect, the present technology provides a light duty liquid detergent composition, comprising: 0.1% to 90% active weight of the total composition of at least one sulfo-estolide surfactant having the following general Formula 1:



wherein n is an integer from 1-30 or a mixture thereof;

one of X and Y is SO₃-Z, the other of X and Y is H (i.e., a hydrogen atom), and X and Y are independently assigned in each repeating unit;

A¹ and A² are linear or branched, saturated or unsaturated, substituted or un-substituted, alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is linear or branched, saturated or unsaturated, substituted or un-substituted hydrocarbon wherein the total number of carbon atoms is from 1 to 24;

W is H or a monovalent or divalent metal cation, ammonium cation, substituted ammonium cation, or an alkyl or substituted alkyl group; and

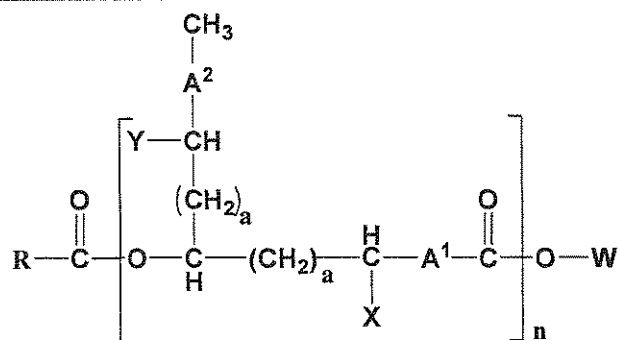
Z is H or a monovalent or divalent metal cation, ammonium or substituted ammonium cation;

0.1% to 70% of at least one alkyl ester sulfonate; and

1% to 99.8% of at least one carrier.

[015] As yet another example aspect of the present technology, light duty liquid (LDL) detergent compositions are provided that contain sulfo-estolides and alkyl ester sulfonates as surfactants. The sulfo-estolide surfactants include sulfo-estolide derivatives and salts of sulfo-estolides. Applications and/or processes of utilizing the presently described sulfo-estolide surfactants, in particular as a component within light duty liquid detergent compositions and/or formulations, are also disclosed.

[0015a] In yet another aspect, the present technology provides a laundry detergent composition, comprising: 5% to 99% by weight of at least one compound having the following general Formula 1:



wherein n is an integer from 1-30 or a mixture thereof;

one of X and Y is SO₃-Z, the other of X and Y is H, and X and Y are independently assigned in each repeating unit;

A¹ and A² are linear or branched, saturated or unsaturated, substituted or un-substituted, alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is linear or branched, saturated or unsaturated, substituted or un-substituted hydrocarbon wherein the total number of carbon atoms is from 1 to 24;

W is a monovalent or divalent metal cation, ammonium cation, substituted ammonium cation, H, or an alkyl or substituted alkyl group;

Z is H, or a monovalent or divalent metal cation, ammonium or substituted ammonium cation;

1% to 50% by weight of at least one alkyl ester sulfonate;

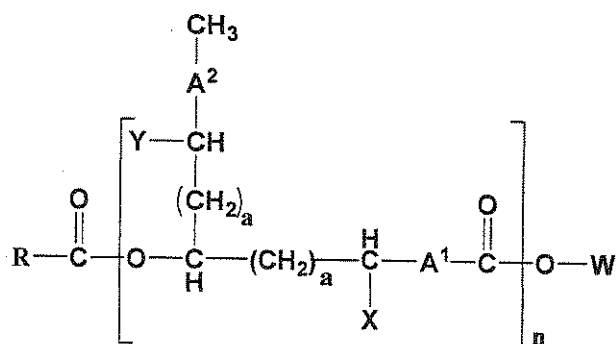
0.5% to 3% by weight of magnesium sulfate;

0% to 25% by weight of cocamide diethanolamine; and

wherein the composition has a pH value in the range of 7 to 10.

[016] In another example aspect, the present technology provides a liquid laundry detergent composition, comprising about 1% to about 99% by weight of at least one compound according to general Formula 1; about 0.1% to about 50% by weight of at least one alkyl ester sulfonate; about 0.5% to about 3% by weight of magnesium sulfate; 0% to about 40% by weight of at least one additional surfactant; and about 1% to about 99% by weight of water. Other components disclosed for inclusion in liquid laundry detergent compositions can also be included.

[016a] In yet another aspect, the present technology provides a laundry detergent composition, comprising: 2% to 90% by weight of one or more compounds having the following general Formula 1:



wherein n is an integer from 1-30 or a mixture thereof;

one of X and Y is $\text{SO}_3\text{-Z}$, the other of X and Y is H, and X and Y are independently assigned in each repeating unit;

A^1 and A^2 are linear or branched, saturated or unsaturated, substituted or unsubstituted alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C_8 to C_{22} ;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is a linear or branched, saturated or unsaturated, substituted or unsubstituted alkyl radical with from 1 to 24 carbon atoms;

W is a monovalent or divalent metal cation, ammonium or substituted ammonium cation, H, or an alkyl or substituted alkyl group;

Z is H, or a monovalent or divalent metal cation, ammonium or substituted ammonium cation;

0.1% to 25% by weight of at least one alkyl ester sulfonate;

0.5% to 3% by weight of magnesium sulfate;

2% to 40% by weight of at least one nonionic surfactant;

0% to 32% by weight of at least one alcohol ether sulfate;

0% to 6% by weight of lauryl dimethylamine oxide;

0% to 6% by weight of C_{12}EO_3 ;

0% to 10% by weight of coconut fatty acid;

0% to 3% by weight of borax pentahydrate;

0% to 6% by weight of propylene glycol;

0% to 10% by weight of sodium citrate;

0% to 6% by weight of triethanolamine;

0% to 6% by weight of monoethanolamine;

0% to 1% by weight of at least one fluorescent whitening agent;

0% to 1.5% by weight of at least one anti-redeposition agent;

0% to 2% by weight of at least one thickener;

0% to 2% by weight of at least one thinner;

0% to 2% by weight of at least one protease;

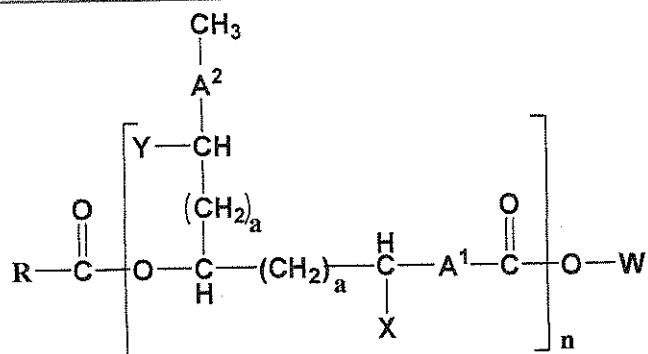
0% to 2% by weight of at least one amylase; and

0% to 2% by weight of at least one cellulase.

[017] As a further example aspect of the present technology, formulations of liquid personal care compositions are provided, such as, but not limited to, liquid hand soaps, body wash, shampoos, 2-in-1 shampoos, antidandruff shampoos, facial cleaners and others. The present

personal care formulations comprise one or more compounds according to general Formula 1 and one or more alkyl ester sulfonates, among other components. Such formulations may include about 0.1% to about 85% by weight of at least one alkyl ester sulfonate; and about 1% to about 99% by weight of at least one carrier.

[017a] In yet another aspect, the present technology provides a liquid personal care composition, comprising: 0.1% to 99% by weight of at least one surfactant having the following general Formula 1:



wherein n is an integer from 1-30 or a mixture thereof;

one of X and Y is SO₃-Z, the other of X and Y is H, and X and Y are independently assigned in each repeating unit;

A¹ and A² are linear or branched, saturated or unsaturated, substituted or un-substituted, alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is linear or branched, saturated or unsaturated, substituted or unsubstituted, wherein the total number of carbon atoms is from 1 to 24;

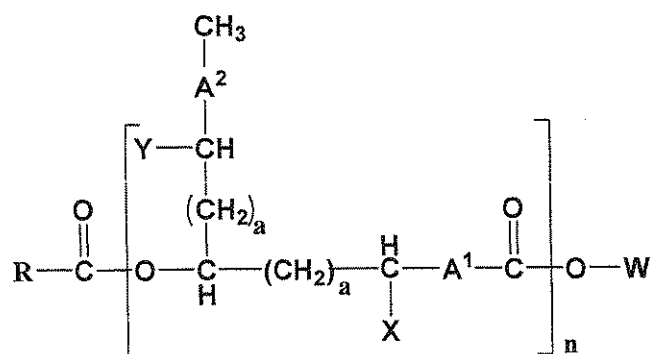
W is H or a monovalent or divalent metal cation, ammonium cation or substituted ammonium cation, or an alkyl or substituted alkyl group;

Z is H or a monovalent or divalent metal cation, ammonium or substituted ammonium cation; and

0.1% to 85% by weight of at least one alkyl ester sulfonate; and

1% to 99.9% by weight of at least one carrier.

[0017b] In yet another aspect, the present technology provides a low-foaming liquid machine dishwashing detergent composition comprising: 0.1% to 20% by active weight of one or more surfactants of the general Formula 1:



wherein n is an integer from 1-30 or a mixture thereof;

one of X and Y is SO₃-Z, the other of X and Y is H, and X and Y are independently assigned in each repeating unit;

A¹ and A² are linear or branched, saturated or unsaturated, substituted or un-substituted, alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is linear or branched, saturated or unsaturated, substituted or un-substituted, wherein the total number of carbon atoms is from 1 to 24;

W is H or a monovalent or divalent metal cation, ammonium cation or substituted ammonium cation, or an alkyl or substituted alkyl group;

Z is H or a monovalent or divalent metal cation, ammonium or substituted ammonium cation;

0.1% to 20% by active weight of at least one alkyl ester sulfonate;

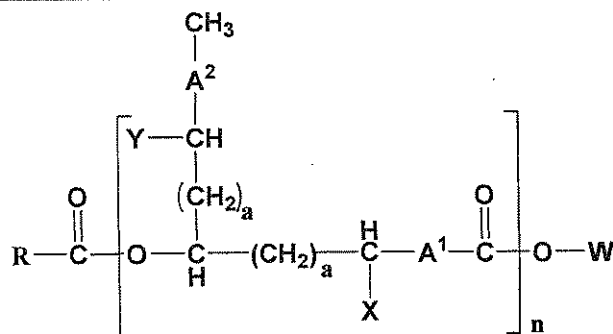
0.01% to 10% by active weight of at least one enzyme;

1% to 99.9% by weight of at least one carrier; and

wherein the low-foaming liquid machine dishwashing detergent composition has a pH from 9 to 14.

[018] As another example aspect of the present technology, a low-foaming liquid machine dishwashing detergent composition is provided, which comprises about 0.1% to about 20% by active weight of one or more surfactants of general Formula 1; about 0.1% to about 20% by weight of at least one alkyl ester sulfonate; about 0.01% to about 10% by active weight of at least one enzyme. The balance of the composition may be a carrier and/or other components. The low-foaming liquid machine dishwashing detergent composition has a pH from about 9 to about 14.

[0018a] In yet another aspect, the present technology provides a hard surface cleaning composition, comprising: 1% to 99% by weight of at least one surfactant having the following general Formula 1:



wherein n is an integer from 1-30 or a mixture thereof;

one of X and Y is SO₃-Z, the other of X and Y is H, and X and Y are independently assigned in each repeating unit;

A¹ and A² are linear or branched, saturated or unsaturated, substituted or un-substituted, alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is linear or branched, saturated or unsaturated, substituted or un-substituted hydrocarbon wherein the total number of carbon atoms is from 1 to 24;

W is H or a monovalent or divalent metal cation, ammonium cation, substituted ammonium cation, or an alkyl or substituted alkyl group; and

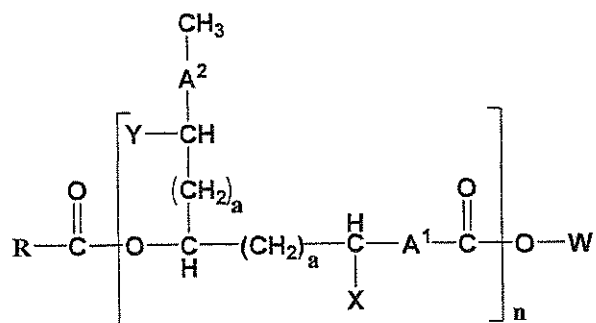
Z is H or a monovalent or divalent metal cation, ammonium or substituted ammonium cation;

0.1% to 85% of at least one alkyl ester sulfonate; and

1% to 99% of at least one carrier.

[019] As yet another example aspect of the present technology, formulations of hard surface cleaning compositions and other general purpose cleaning compositions are provided. Such formulations comprises about 1% to about 99% by weight of at least one surfactant according to general Formula 1; about 0.1% to about 85% of at least one alkyl ester sulphonate; and about 1% to about 99% of at least one carrier.

[0019a] In yet another aspect, the present technology provides a laundry detergent composition, comprising: a mixture of sodium and potassium salts of sulfo-estolides having the following general Formula 1:



wherein n is an integer from 1-30 or a mixture thereof;

one of X and Y is SO₃-Z, the other of X and Y is H, and X and Y are independently assigned in each repeating unit;

A¹ and A² are linear or branched, saturated or unsaturated, substituted or unsubstituted alkyl diradicals wherein the total number of carbons for each repeating unit is independent and in the range of C₈ to C₂₂;

a is 0, 1, or 2, and is independently assigned in each repeating unit;

R is a linear or branched, saturated or unsaturated, substituted or unsubstituted alkyl radical with from 1 to 24 carbon atoms;

W is a sodium or potassium cation, H, or an alkyl or substituted alkyl group;

Z is a sodium or potassium cation;

at least one alkyl ester sulphonate;

at least one carrier.

[020] As another example aspect of the present technology, formulations are provided which comprise one or more compounds according to general Formula 1 and one or more alkyl ester sulfonates (among other components) where W in general Formula 1 is a sodium or potassium cation, H, or an alkyl or substituted alkyl group, and Z in general Formula 1 is a sodium or potassium cation. Such formulations include heavy duty liquid laundry detergent compositions, light duty liquid laundry detergent compositions, and others.

DETAILED DESCRIPTION OF THE INVENTION

[021] The present technology, in general, relates to sulfo-estolides. More particularly, the present technology relates to sulfo-estolides derivatives and salts of sulfo-estolides, their methods of manufacture and the various applications and/or processes of utilizing them. The compositions described here include, but are not limited to, sulfo-estolides having the structure of general Formula 1: