What is claimed is:

1. A process useful for forming an aqueous composition of matter comprising a mixture of alkyl-substituted hydroxyethane sulfonates comprising the steps of:

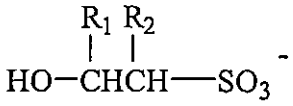
a) providing at least one alkylene oxide having between 3 and 8 carbon atoms per molecule;

b) providing an aqueous solution comprising bi-sulfite anions;

c) contacting the aqueous solution with the alkylene oxide while maintaining the pH at a range between about 6.0 and about 10.0,

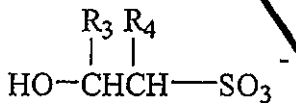
wherein the mixture of alkyl-substituted hydroxyethane sulfonates comprises:

(i) a first anion having the structure:



wherein one of R_1 and R_2 is a straight chain or branched C_1 to C_6 alkyl group and the remaining R_1 and R_2 is hydrogen; and

(ii) a second anion having the structure:



wherein one of R_3 and R_4 is a straight chain or branched C_1 to C_6 alkyl group and the remaining R_3 and R_4 is hydrogen.

2. The process according to claim 1 wherein the aqueous solution of bi-sulfite ions further includes at least one ion selected from the group consisting of: sodium, potassium, lithium, magnesium, calcium and ammonium ions.

3. The process according to claim 1 wherein the contacting is conducted at a temperature range of between about 20° C to about 200° C.

4. The process according to claim 1 wherein the contacting is conducted at a pressure range of between about 0.5 atmospheres and about 7 atmospheres.

5. A process useful for forming an aqueous composition of matter comprising a mixture of alkyl-substituted hydroxyethane sulfonates comprising the steps of:

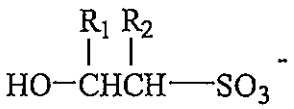
a) providing at least one alkylene oxide having between 3 and 8 carbon atoms per molecule;

b) providing an aqueous solution comprising bi-sulfite anions wherein the bi-sulfite anions are produced by reacting sulfur dioxide with an hydroxide solution;

c) contacting the aqueous solution with the alkylene oxide, while maintaining the pH at a range between about 7.0 and about 8.0,

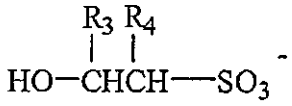
wherein the mixture of alkyl-substituted hydroxyethane sulfonates comprises:

(i) a first anion having the structure:



wherein one of R_1 and R_2 is a straight chain or branched C_1 to C_6 alkyl group and the remaining R_1 and R_2 is hydrogen; and

(ii) a second anion having the structure:



wherein one of R_3 and R_4 is a straight chain or branched C_1 to C_6 alkyl group and the remaining R_3 and R_4 is hydrogen.

6. The process according to claim 5 wherein the hydroxide solution is a 50% by weight sodium hydroxide solution.

7. A process useful for forming an aqueous composition of matter comprising a mixture of alkyl-substituted hydroxyethane sulfonates comprising the steps of:

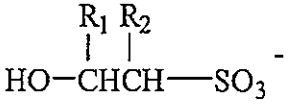
a) providing an alkylene oxide selected from the group consisting of: propylene oxide and butylene oxide, and mixtures thereof;

b) providing an aqueous solution of bi-sulfite anions;

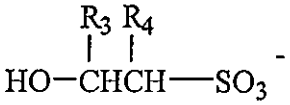
c) contacting the aqueous solution with the alkylene oxide, while maintaining the pH at a range of between about 6.0 and 10.0,

wherein the mixture of alkyl-substituted hydroxyethane sulfonates comprises:

(i) a first anion having the structure:



and (ii) a second anion having the structure:



wherein R_1 is independently selected from the group consisting of: methyl and ethyl; R_2 is hydrogen; R_3 is hydrogen; and R_4 is independently selected from the group consisting of: methyl and ethyl.

8. A process for forming a powder comprising a mixture of sodium alkyl-substituted hydroxyethane sulfonates comprising the steps of:

a) providing an alkylene oxide selected from the group consisting of: propylene oxide and butylene oxide, and mixtures thereof;

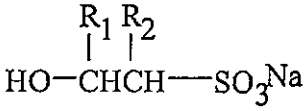
b) providing an aqueous solution of sodium bi-sulfite;

c) contacting the aqueous solution of sodium bi-sulfite with the alkylene oxide, while maintaining the pH at a range of between about 6.0 and 10.0 for about 1 to about 6 hours to form a product mixture; and

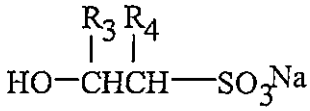
d) drying the product mixture to the powder,

wherein the mixture of sodium alkyl-substituted hydroxyethane sulfonates comprises:

(i) a first sodium alkyl-substituted hydroxyethane sulfonate having the structure:



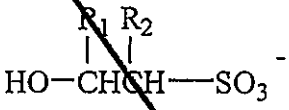
and (ii) a second sodium alkyl-substituted hydroxyethane sulfonate having the structure:



wherein R_1 is independently selected from the group consisting of: methyl and ethyl; R_2 is hydrogen; R_3 is hydrogen; and R_4 is independently selected from the group consisting of: methyl and ethyl.

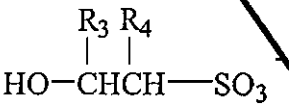
9. A process for producing a surfactant material useful as a component of a personal care cleansing composition which comprises:

a) providing a mixture of isethionate anions which comprises a first anion having the structure:



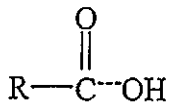
in which R_1 is straight chain or branched C_1 to C_6 alkyl group and R_2 is hydrogen; and

(ii) a second anion having the structure:



in which R_3 is hydrogen and R_4 is an straight chain or branched C_1 to C_6 alkyl group;

b) contacting the mixture of isethionate anions with one or more carboxylic acids of the formula:



in which R is any hydrocarbon group having between about 4 and about 25 carbon atoms, including straight-chain, branched, saturated and unsaturated hydrocarbon groups so as to form a reactive mixture; and

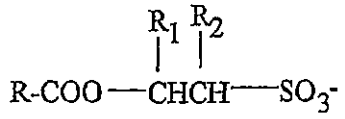
c) heating the reactive mixture at any temperature in the range of between 90° C and 240°C to produce an acyl alkylisethionate mixture containing at least two different anions which are isethionate esters of a carboxylic acid.

10. The process according to claim 9 further comprising the step applying a vacuum of about 1 mm to about 200 mm Hg at a temperature of about 100° to about 200°C to reduce the amount of carboxylic acid in the surfactant material to less than 10% by weight.

CLAIMS:

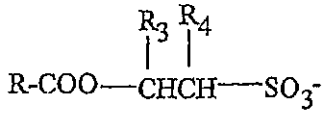
1. An ester anion mixture for use as a surfactant in formulating a personal care cleansing product comprising:

a) a first ester anion having the structure:



and

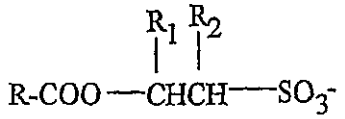
b) a second ester anion having the structure:



in which R is in each occurrence a hydrocarbon group having between 4 and 25 carbon atoms, wherein the hydrocarbon group is a straight-chain, branched, saturated or unsaturated hydrocarbon group; wherein R_1 is an alkyl group selected from the group consisting of: C_1 to C_6 alkyl, and R_2 is hydrogen; R_4 is an alkyl group selected from the group consisting of: C_1 to C_6 alkyl, and R_3 is hydrogen.

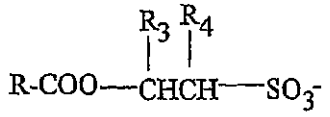
2. An ester anion mixture for use as surfactant in formulating a cleansing product which comprises:

a) a first ester anion having the structure:



and

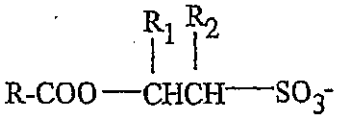
b) a different second ester anion having the structure:



in which R is a hydrocarbon group having between 4 and 25 carbon atoms, wherein the hydrocarbon group is a straight-chain, branched, saturated or unsaturated hydrocarbon group; R_1 is independently selected from the group consisting of: methyl and ethyl; R_2 is hydrogen; R_3 is hydrogen; and R_4 is independently selected from the group consisting of: methyl and ethyl.

3. A composition of matter that is a concentrate for use in preparing a cleaning product comprising:

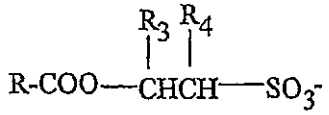
a) a first ester anion of an alkylisethionic acid according to the formula:



wherein R is a hydrocarbon group having between 4 and 25 carbon atoms, wherein the hydrocarbon group is a straight-chain, branched, saturated, or unsaturated hydrocarbon group; R_1 is an alkyl group selected from the group consisting of: C_1 to C_6 alkyl and R_2 is hydrogen; and

b) at least one member selected from the group consisting of: water, a surfactant and optional ingredient used in preparing the cleansing product; and

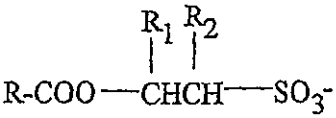
c) a different second ester anion having the structure:



in which R is in each occurrence a hydrocarbon group having between 4 and 25 carbon atoms, wherein the hydrocarbon group is a straight-chain, branched, saturated or unsaturated hydrocarbon group; R_4 is an alkyl group selected from the group consisting of: C_1 to C_6 alkyl, and R_3 is hydrogen.

4. A composition of matter for use in preparing a personal care cleaning product which comprises:

a) any amount between 99.50% and 0.25% of a first component which comprises a first ester anion of an alkylisethionic acid according to the formula:

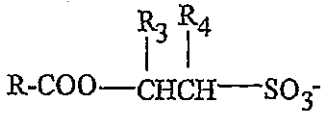


in which R is a hydrocarbon group having between 4 and 25 carbon atoms, wherein the hydrocarbon group is a straight-chain, branched, saturated, or unsaturated hydrocarbon group; R_1 is an alkyl group selected from the group consisting of: C_1 to C_6 alkyl, and R_2 is hydrogen; and

b) any amount between 99.75% and 0.50% of a second component comprising one or more members selected from the group consisting of: fatty acids, alkyl sulfates, an ethanolamine, an amine oxide, alkali carbonates, water, ethanol, isopropanol, pine oil, sodium chloride, sodium silicate, polymers, alcohol alkoxylates, zeolites, perborate salts, alkali sulfates, enzymes, hydrotropes, dyes, fragrances, preservatives, brighteners, builders, polyacrylates, essential oils, alkali hydroxides, water-soluble branched alkylbenzene sulfonates, ether sulfates, alkylphenol alkoxylates, fatty acid amides, alpha olefin sulfonates, paraffin sulfonates, betaines, chelating agents, tallowamine ethoxylates, polyetheramine

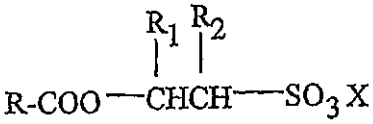
ethoxylates, ethylene oxide/propylene oxide block copolymers, alcohol ethylene oxide/propylene oxide low foam surfactants, methyl ester sulfonates, alkyl polysaccharides, N-methyl glucamides, alkylated sulfonated diphenyl oxide, and polyethylene glycol; and

c) a different second ester anion having the structure:



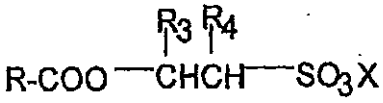
in which R is in each occurrence a hydrocarbon group having between 4 and 25 carbon atoms, wherein the hydrocarbon group is a straight-chain, branched, saturated or unsaturated hydrocarbon group; R_4 is an alkyl group selected from the group consisting of: C_1 to C_6 alkyl, and R_3 is hydrogen.

5. A personal care cleanser comprising a first acylalkylisethionate ester having the formula



wherein R is a hydrocarbon group having between 4 and 25 carbon atoms; R_1 is a branched or straight-chain aliphatic C_1 to C_6 alkyl group and R_2 is hydrogen; and X is selected from the group consisting of hydrogen, an alkali metal, an alkaline earth metal, zinc, aluminum, ammonium and ammonium ions substituted with one or more organic groups; and

a different second acylalkylisethionate ester having the formula:

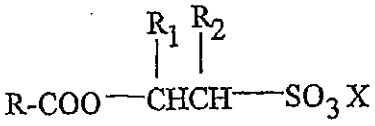


wherein R is a hydrocarbon group having between 4 and 25 carbon atoms; R_3 is hydrogen; R_4 is a branched or straight-chain aliphatic C_1 to C_6 alkyl group; and X is selected from the group consisting of hydrogen, an alkali metal, and alkaline earth metal, zinc, aluminum, ammonium and ammonium ions substituted with one or more organic groups.

6. The personal care cleanser of claim 5 further comprising at least one member selected from the group consisting of: amphoteric surfactant; zwitterionic surfactant; anionic surfactant; nonionic surfactant; cationic surfactant; and water.

7. A composition of matter comprising:

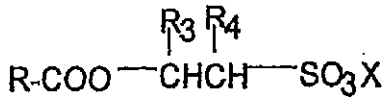
(i) a first acylalkylisethionate ester having the formula:



wherein R is a hydrocarbon group having between 4 and 25 carbon atoms; R_1 is a straight-chain aliphatic C_1 to C_6 alkyl group; R_2 is hydrogen; and X is selected from the group consisting of hydrogen, an alkali metal, an alkaline earth metal, zinc, aluminum, ammonium and ammonium ions substituted with one or more organic groups; and

(ii) at least one other member selected from the group consisting of: amphoteric surfactant; zwitterionic surfactant; anionic surfactant; nonionic surfactant; cationic surfactant; and water; and

(iii) a different second acylalkylisethionate ester having the formula:



wherein R is a hydrocarbon group having between 4 and 25 carbon atoms; R_3 is hydrogen; R_4 is a branched or straight-chain aliphatic C_1 to C_6 alkyl group; and X is selected from the group

consisting of hydrogen, an alkali metal, and alkaline earth metal, zinc, aluminum, ammonium and ammonium ions substituted with one or more organic groups.

8. The composition of matter of claim 7, wherein the acylalkylisethionate ester is present in an amount ranging between about 1% by weight to about 60% by weight.

9. The composition of matter of claim 7, wherein the composition of matter is a shampoo, baby shampoo, baby wipe, children wipe, make-up remover tissue, showergel, foam bath, liquid soap, soap bar, syndet bar, or acne wash.

10. The mixture of claim 1, wherein the alkyl group of R_1 is the same as the alkyl group of R_4.

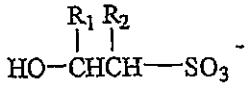
11. The composition of claim 3, wherein the alkyl group of R_1 is the same as the alkyl group of R_4.

12. The composition of claim 3, wherein R_1 and R_4 are each independently methyl or ethyl.

13. A process for producing a surfactant material for use as a component of a personal care cleansing composition which comprises:

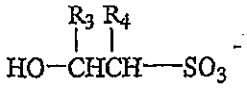
a) providing a mixture of isethionate anions which comprises

(i) a first anion having the structure:



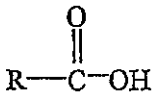
in which R_1 is straight chain or branched C_1 to C_6 alkyl group and R_2 is hydrogen; and

(ii) a second anion having the structure:



in which R_3 is hydrogen and R_4 is an straight chain or branched C_1 to C_6 alkyl group;

b) contacting the mixture of isethionate anions with one or more carboxylic acids of the formula:



in which R is any hydrocarbon group having between 4 and 25 carbon atoms, wherein the hydrocarbon group is a straight-chain, branched, saturated or unsaturated hydrocarbon group so as to form a reactive mixture; and

c) heating the reactive mixture at a temperature in the range of between 90°C and 240°C to produce an acyl alkylisethionate mixture containing at least two different anions which are isethionate esters of a carboxylic acid.

14. The process according to claim 13 further comprising the step applying a vacuum of about 1 mm to about 200 mm Hg at a temperature of about 100° to about 200°C to reduce the amount of carboxylic acid in the surfactant material to less than 10% by weight.

15. The process according to claim 13 or 14, wherein an alkyl-substituted hydroxyethane isethionic acid is provided as a catalyst to catalyse the reaction of step c).

16. The process according to any one of claims 13 to 15, wherein the temperature of the heating of step c) is in the range of 90°C to 180°C.