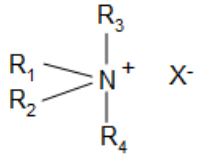
[0009] There is a need in the art for solid, concentrated amine, protonated amine or quaternary ammonium-containing compositions that are easily dispersed in water, and which leave no residue after being used in the desired application. It would also be an advantage to have a solid composition that is flowable.

SUMMARY OF THE DISCLOSURE

[0009a] In one aspect, there is provided a solid water-dispersible composition comprising:

(a) from 5% to 70% by weight of at least one quaternary ammonium compound, amine or protonated amine, or mixtures thereof, wherein the quaternary ammonium compound is selected from (i) an esterquat that is the quaternized reaction product of a fatty acid source having an Iodine Value of 40 to 130 reacted with triethanolamine (TEA) at a fatty acid to alkanolamine molar ratio of 1.3:1 to 1.8:1, or reacted with methyl diethanolamine (MDEA) at a fatty acid to alkanolamine molar ratio of 1.0:1 to 2.0:1, (ii) an amidoamine quat, or (iii) a quaternary ammonium compound having the following chemical formula:



where R_1 is a straight or branched, saturated or unsaturated, alkyl or alkene chain having

from 6 to 22 carbon atoms;

R_2 is a straight or branched, saturated or unsaturated, alkyl or alkene chain having from 1 to 16 carbon atoms;

R_3 is methyl, ethyl, benzyl or ethylbenzyl;

R_4 is methyl or ethyl; and

X^- is: Cl^-, Br^-, F^-, I^-, $(SO_4^{2-})_{\frac{1}{2}}$, $CH_3OSO_3^-$, HCO_3^-, $(CO_3^{2-})_{\frac{1}{2}}$, or CH_3COO^-,

and wherein the amine or protonated amine is selected from an esteramine, an amidoamine, or an amidoamine salt;

(b) from 30% to 95% by weight of water-soluble polysaccharide having an aerated bulk density in the range of 100 g/L to 600 g/L, wherein the water-soluble polysaccharide comprises maltodextrin or agglomerated maltodextrin; and

(c) optionally, up to 30% by weight of a solubilizer;

wherein,

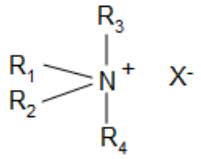
the quaternary ammonium compound, amine or protonated amine has at least one alkyl chain of 10 carbons or greater, and is absorbed by the polysaccharide; with the proviso that, when the water-soluble polysaccharide is not agglomerated, the amount of the quaternary ammonium compound, amine, or protonated amine in the solid composition is not greater than 20% by weight, and when the water-soluble polysaccharide is agglomerated and has an aerated bulk density in the range of 250 g/L to 600 g/L, the amount of the quaternary ammonium compound, amine, or protonated amine in the solid composition is not greater than 35% by weight.

[0009b] In another aspect, there is provided a method of making a water-dispersible solid composition comprising the steps of:

providing a water-soluble polysaccharide in an amount of 30% to 95% by weight, based on the total weight of the solid composition, wherein the water-soluble polysaccharide comprises maltodextrin or agglomerated maltodextrin;

adding from 5% to 70% by weight of at least one liquid or molten amine, protonated amine, or quaternary ammonium compound, or mixtures thereof, to the water-soluble polysaccharide, wherein the quaternary

ammonium compound is selected from (i) an esterquat that is the quaternized reaction product of a fatty acid source having an Iodine Value of 40 to 130 reacted with triethanolamine (TEA) at a fatty acid to alkanolamine molar ratio of 1.3:1 to 1.8:1, or reacted with methyl diethanolamine (MDEA) at a fatty acid to alkanolamine molar ratio of 1.0:1 to 2.0:1, (ii) an amidoamine quat, or (iii) a quaternary ammonium compound having the following chemical formula:



where R_1 is a straight or branched, saturated or unsaturated, alkyl or alkene chain having

from 6 to 22, preferably from 8 to 18 carbon atoms;

R_2 is a straight or branched, saturated or unsaturated, alkyl or alkene chain having from 1 to 16 carbon atoms, preferably from 1 to 10 carbon atoms;

R_3 is methyl, ethyl, benzyl or ethylbenzyl;

R_4 is methyl or ethyl; and

X^- is: Cl^-, Br^-, F^-, I^-, $(SO_4^{2-})_{\frac{1}{2}}$, $CH_3OSO_3^-$, HCO_3^-, $(CO_3^{2-})_{\frac{1}{2}}$, or CH_3COO^-,

and wherein the amine or protonated amine is selected from an esteramine or an amidoamine;

with the proviso that, when the water-soluble polysaccharide is not agglomerated, the amount of the amine, protonated amine, or quaternary ammonium compound added to the water-soluble polysaccharide is not greater than 20% by weight of the solid composition, and when the water-soluble polysaccharide is agglomerated, and has an aerated bulk density in the range of 250 g/L to 600 g/L, the amount of the amine, protonated amine, or quaternary ammonium compound added to the agglomerated

polysaccharide is not greater than 35% by weight of the solid composition; and

mixing the water-soluble polysaccharide and the amine, protonated amine or quaternary ammonium compound until the amine, protonated amine or quaternary ammonium compound is absorbed by the water-soluble polysaccharide to form the water-dispersible solid composition.

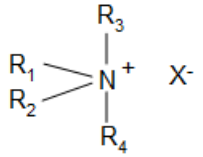
[0010] One example of the present technology is directed to a water-dispersible solid composition that comprises (a) from about 30% to about 95% by weight of at least one polysaccharide, (b) from about 5% to about 70% by weight of at least one amine, protonated amine, or quaternary ammonium compound, and (c) optionally, 0 to about 30% by weight of a solubilizer, wherein the amine, protonated amine, or quaternary ammonium compound has at least one alkyl chain of 10 carbons or greater, and is absorbed by the polysaccharide; with the proviso that, when the water-soluble polysaccharide is not agglomerated, the amount of the quaternary ammonium compound, amine, or protonated amine in the solid composition is not greater than 20% by weight, and when the water-soluble polysaccharide is agglomerated and has an aerated bulk density in the range of 250 g/L to 600 g/L, the amount of the quaternary ammonium compound, amine, or protonated amine in the solid composition is not greater than 35% by weight.

[0011] In another example, the present technology is directed to end use products that can be formulated with the solid composition, including hair care repair and conditioning compositions, fabric care compositions, antimicrobial compositions, and oilfield compositions.

Claims

1. A solid water-dispersible composition comprising:

(a) from 5% to 70% by weight of at least one quaternary ammonium compound, amine or protonated amine, or mixtures thereof, wherein the quaternary ammonium compound is selected from (i) an esterquat that is the quaternized reaction product of a fatty acid source having an Iodine Value of 40 to 130 reacted with triethanolamine (TEA) at a fatty acid to alkanolamine molar ratio of 1.3:1 to 1.8:1, or reacted with methyl diethanolamine (MDEA) at a fatty acid to alkanolamine molar ratio of 1.0:1 to 2.0:1, (ii) an amidoamine quat, or (iii) a quaternary ammonium compound having the following chemical formula:



where R_1 is a straight or branched, saturated or unsaturated, alkyl or alkene chain having

from 6 to 22 carbon atoms;

R_2 is a straight or branched, saturated or unsaturated, alkyl or alkene chain having from 1 to 16 carbon atoms;

R_3 is methyl, ethyl, benzyl or ethylbenzyl;

R_4 is methyl or ethyl; and

X^- is: Cl^-, Br^-, F^-, I^-, $(SO_4^{2-})_{\frac{1}{2}}$, $CH_3OSO_3^-$, HCO_3^-, $(CO_3^{2-})_{\frac{1}{2}}$, or CH_3COO^-,

and wherein the amine or protonated amine is selected from an esteramine, an amidoamine, or an amidoamine salt;

(b) from 30% to 95% by weight of water-soluble polysaccharide having an aerated bulk density in the range of 100 g/L to 600 g/L, wherein the water-soluble polysaccharide comprises maltodextrin or agglomerated maltodextrin; and

(c) optionally, up to 30% by weight of a solubilizer;

wherein,

the quaternary ammonium compound, amine or protonated amine has at least one alkyl chain of 10 carbons or greater, and is absorbed by the polysaccharide; with the proviso that, when the water-soluble polysaccharide is not agglomerated, the amount of the quaternary ammonium compound, amine, or protonated amine in the solid composition is not greater than 20% by weight, and when the water-soluble polysaccharide is agglomerated and has an aerated bulk density in the range of 250 g/L to 600 g/L, the amount of the quaternary ammonium compound, amine, or protonated amine in the solid composition is not greater than 35% by weight.

2. The composition of claim 1, wherein the at least one amine, protonated amine or quaternary ammonium compound is at least one esteramine or esterquat.

3. The composition of claim 1 or 2, wherein the fatty acid source is derived from sunflower oil, canola oil, low erucic acid rapeseed (LEAR) oil, or a combination thereof.

4. The composition of any one of claims 2-3, wherein the quaternary ammonium compound is an esterquat having a Hansen polarity parameter of greater than 5.

5. The composition of 1, wherein the at least one amine, protonated amine or quaternary ammonium compound is at least one amidoamine, amidoamine salt, or amidoamine quat.

6. The composition of any one of claims 1-5, wherein the solid composition is in the form of a powder.

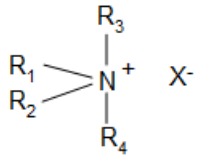
7. The composition of any one of claims 1-6, wherein the solid composition has a flowability parameter value above 2.0 and a cohesion parameter value below 2.0.

8. A method of making a water-dispersible solid composition comprising the steps of:

providing a water-soluble polysaccharide in an amount of 30% to 95% by weight, based on the total weight of the solid composition, wherein the water-soluble polysaccharide comprises maltodextrin or agglomerated maltodextrin;

adding from 5% to 70% by weight of at least one liquid or molten amine, protonated amine, or quaternary ammonium compound, or mixtures thereof, to the water-soluble polysaccharide, wherein the quaternary ammonium compound is selected from (i) an esterquat that is the quaternized reaction product of a fatty acid source having an Iodine Value of 40 to 130 reacted with triethanolamine (TEA) at a fatty acid to alkanolamine molar ratio of 1.3:1 to 1.8:1, or reacted with methyl diethanolamine (MDEA) at a fatty acid

to alkanolamine molar ratio of 1.0:1 to 2.0:1, (ii) an amidoamine quat, or (iii) a quaternary ammonium compound having the following chemical formula:



where R_1 is a straight or branched, saturated or unsaturated, alkyl or alkene chain having

from 6 to 22, preferably from 8 to 18 carbon atoms;

R_2 is a straight or branched, saturated or unsaturated, alkyl or alkene chain having from 1 to 16 carbon atoms, preferably from 1 to 10 carbon atoms;

R_3 is methyl, ethyl, benzyl or ethylbenzyl;

R_4 is methyl or ethyl; and

X^- is: Cl^-, Br^-, F^-, I^-, $(SO_4^{2-})_{\frac{1}{2}}$, $CH_3OSO_3^-$, HCO_3^-, $(CO_3^{2-})_{\frac{1}{2}}$, or CH_3COO^-,

and wherein the amine or protonated amine is selected from an esteramine or an amidoamine;

with the proviso that, when the water-soluble polysaccharide is not agglomerated, the amount of the amine, protonated amine, or quaternary ammonium compound added to the water-soluble polysaccharide is not greater than 20% by weight of the solid composition, and when the water-soluble polysaccharide is agglomerated, and has an aerated bulk density in the range of 250 g/L to 600 g/L, the amount of the amine, protonated amine, or quaternary ammonium compound added to the agglomerated polysaccharide is not greater than 35% by weight of the solid composition; and

mixing the water-soluble polysaccharide and the amine, protonated amine or quaternary ammonium compound until the amine, protonated amine or

quaternary ammonium compound is absorbed by the water-soluble polysaccharide to form the water-dispersible solid composition.

9. The method of claim 8, further comprising the step of adding from 0.5% to 50% by weight of a solubilizer before, during, or after the addition of the protonated amine or quaternary ammonium compound.

10. The method any one of claims 8-9, wherein the at least one amine, protonated amine, or quaternary ammonium compound is at least one esteramine or esterquat.

11. The method of any one of claims 8-10, wherein the fatty acid source is derived from sunflower oil, canola oil, LEAR rapeseed oil, or a combination thereof.

12. The method of any one of claims 8-9, wherein the at least one amine, protonated amine, or quaternary ammonium compounds is at least one amidoamine, amidoamine salt, or amidoamine quat.

13. The method of any one of claims 9-12, wherein the solubilizer is selected from the group consisting of citric acid, sodium citrate, potassium carbonate, urea, sodium acetate, magnesium sulfate, and combinations thereof.

14. The method of any one of claims 8-13, wherein the solid composition is in the form of a powder.

15. The method of claim 14, wherein the powder is encapsulated within a water-soluble or water-rupturable film or coating.