WHAT IS CLAIMED IS:

1. A process for preparing a salt of a sulfurized alkyl-substituted hydroxyaromatic composition having a reduced content of unsulfurized alkyl-substituted hydroxyaromatic compound and its unsulfurized metal salt, the process comprising the steps of:

(a) providing a composition comprising (i) a salt of a sulfurized alkyl-substituted hydroxyaromatic compound; (ii) an unsulfurized alkyl-substituted hydroxyaromatic compound and (iii) an unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound; wherein the alkyl-substituted hydroxyaromatic compound is derived from alkylation of a hydroxyaromatic compound with one or more olefins comprising C_9 to C_{18} oligomers of monomers selected from propylene, butylene or mixtures thereof;

(b) protonating the unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound with an effective amount of an acidic compound capable of protonating the unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound; and

(c) removing the unsulfurized alkyl-substituted hydroxyaromatic compound and the protonated unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound from the composition.

2. The process according to Claim 1, wherein the hydroxyaromatic compound is a phenol and the one or more olefins comprising C_9 to C_{18} oligomers are one or more olefins comprising C_9 to C_{18} propylene oligomers.

3. The process according to Claims 1 or 2, wherein the salt of a sulfurized alkyl-substituted hydroxyaromatic composition provided in step (a) is an overbased salt of a sulfurized alkyl-substituted hydroxyaromatic composition.

4. The process according to Claims 1-3, wherein the acidic compound is a saturated or unsaturated carboxylic acid.

5. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is selected from the group consisting of a saturated or unsaturated aliphatic monocarboxylic acid, a saturated or unsaturated cycloaliphatic monocarboxylic acid, a saturated or unsaturated aromatic monocarboxylic acid, a saturated or unsaturated aliphatic dicarboxylic acid, a saturated or unsaturated cycloaliphatic dicarboxylic acid, a saturated or unsaturated aromatic dicarboxylic acid, a saturated or unsaturated aliphatic tricarboxylic acid, a saturated or unsaturated cycloaliphatic tricarboxylic acid, a saturated or unsaturated aromatic tricarboxylic acid and mixtures thereof.

6. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is selected from the group consisting of formic acid, acetic acid, phenylacetic acid, propionic acid, alanine, butyric acid, hydroxybutyric acid, valeric acid, hexanoic acid, heptanoic acid, octanoic acid, nonanoic acid, decanoic acid, 2-methylpropionic acid, 2-methylbutyric acid, 3-methylbutyric acid, 2-methylpentanoic acid, 2-ethylhexanoic acid, 2-propylheptanoic acid, pivalic acid, neononanoic acid, neodecanoic acid, neotridecanoic acid, stearic acid, myristic acid, palmitic acid, linolic acid, linoleic acid, oleic acid, lauric acid, acrylic acid, methacrylic acid, crotonic acid, cinnamic acid, and mixtures thereof.

7. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is a C_4 to C_{22} linear saturated or unsaturated monocarboxylic acid selected from the group consisting of butyric acid, valeric acid, caproic acid, enanthic acid, caprylic acid, pelargonic acid, capric acid, undecylic acid, lauric acid, myristic acid, tridecylic acid, pentadecanoic acid, palmitic acid, margaric acid, stearic acid, arachidic acid, behenic acid, myristoleic acid, oleic acid, arachidonic acid, linoleic acid, and mixtures thereof.

8. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is an aromatic monocarboxylic acid selected from the group consisting of benzoic acid, nitrobenzoic acid, monohydroxybenzoic acid such as salicylic, 3-hydroxybenzoic acid and 4-

hydroxybenzoic acid, alkylhydroxybenzoic acid, chlorobenzoic acid, methoxybenzoic acid, t-butyl benzoic acid, methylbenzoic acid, phenyl acetic acid, 3-phenyl propionic acid, 4-phenyl butyric acid, 3-(p-chlorophenyl) butanoic acid, and mixtures thereof.

9. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is an aliphatic dicarboxylic acid selected from the group consisting of oxalic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid, malonic acid, succinic acid, glutaric acid, adipic acid, maleic acid and fumaric acid. Examples of aromatic dicarboxylic acids include, but are not limited to, phthalic acid, terephthalic acid, isophthalic acid, 1,5-naphthalene dicarboxylic acid, 1,4-naphthalene dicarboxylic acid, 1,8-naphthalene dicarboxylic acid, 2,8-naphthalene dicarboxylic acid, 2,6-naphthalene dicarboxylic acid, traumatic acid, muconic acid and mixtures thereof.

10. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is an aromatic dicarboxylic acid selected from the group consisting of phthalic acid, terephthalic acid, isophthalic acid, 1,5-naphthalene dicarboxylic acid, 1,4-naphthalene dicarboxylic acid, 1,8-naphthalene dicarboxylic acid, 2,8-naphthalene dicarboxylic acid, 2,6-naphthalene dicarboxylic acid, traumatic acid, muconic acid, and mixtures thereof.

11. The process of Claim 4, wherein the saturated or unsaturated carboxylic acid is a tricarboxylic acid selected from the group consisting of citric acid, isocitric acid, aconitic acid (unsaturated), carbalyllic acid mellitic (benzenehexacarboxylic) acid, and mixtures thereof.

12. The process according to Claims 1-3, wherein the acidic compound is a polyalkenyl succinic acid or anhydride thereof or an aliphatic sulfonic acid, aromatic sulfonic acid or mixtures thereof or an amine or ammonium salt.

13. The process according to Claims 1-14, wherein the effective amount of the acidic compound is from about 1 wt. % to about 25 wt. %, based on the total amount of the neutral or overbased salt of a sulfurized alkyl-substituted hydroxyaromatic composition.

14. The process according to Claims 1-13, wherein the step of removing the unsulfurized alkyl-substituted hydroxyaromatic compound and the protonated unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound from the composition comprises distilling the unsulfurized alkyl-substituted hydroxyaromatic compound and the protonated unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound from the composition of step (b).

15. The process according to Claims 1-14, wherein the salt of the sulfurized alkyl-substituted hydroxyaromatic composition obtained in step (c) contains less than about 1.5 wt. % of the unsulfurized alkyl-substituted hydroxyaromatic compound and its metal salt or less than about 0.3 wt. % of the unsulfurized alkyl-substituted hydroxyaromatic compound and its metal salt.

WHAT IS CLAIMED IS:

1. A process for preparing a salt of a sulfurized alkyl-substituted hydroxyaromatic composition having a reduced content of unsulfurized alkyl-substituted hydroxyaromatic compound and its unsulfurized metal salt, the process comprising the steps of:

(a) providing a composition comprising (i) a salt of a sulfurized alkyl-substituted hydroxyaromatic compound; (ii) an unsulfurized alkyl-substituted hydroxyaromatic compound and (iii) an unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound; wherein the alkyl-substituted hydroxyaromatic compound is derived from alkylation of a hydroxyaromatic compound with one or more olefins comprising C_9 to C_{18} oligomers of monomers selected from propylene, butylene or mixtures thereof;

(b) protonating the unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound with an effective amount of an acidic compound capable of protonating the unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound; and

(c) removing the unsulfurized alkyl-substituted hydroxyaromatic compound and the protonated unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound from the composition.

2. The process according to Claim 1, wherein the hydroxyaromatic compound is a phenol and the one or more olefins comprising C_9 to C_{18} oligomers are one or more olefins comprising C_9 to C_{18} propylene oligomers.

3. The process according to Claims 1 or 2, wherein the salt of a sulfurized alkyl-substituted hydroxyaromatic composition provided in step (a) is an overbased salt of a sulfurized alkyl-substituted hydroxyaromatic composition.

4. The process according to Claims 1-3, wherein the acidic compound is a saturated or unsaturated carboxylic acid.

5. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is selected from the group consisting of a saturated or unsaturated aliphatic monocarboxylic acid, a saturated or unsaturated cycloaliphatic monocarboxylic acid, a saturated or unsaturated aromatic monocarboxylic acid, a saturated or unsaturated aliphatic dicarboxylic acid, a saturated or unsaturated cycloaliphatic dicarboxylic acid, a saturated or unsaturated aromatic dicarboxylic acid, a saturated or unsaturated

aliphatic tricarboxylic acid, a saturated or unsaturated cycloaliphatic tricarboxylic acid, a saturated or unsaturated aromatic tricarboxylic acid and mixtures thereof.

6. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is selected from the group consisting of formic acid, acetic acid, phenylacetic acid, propionic acid, alanine, butyric acid, hydroxybutyric acid, valeric acid, hexanoic acid, heptanoic acid, octanoic acid, nonanoic acid, decanoic acid, 2-methylpropionic acid, 2-methylbutyric acid, 3-methylbutyric acid, 2-methylpentanoic acid, 2-ethylhexanoic acid, 2-propylheptanoic acid, pivalic acid, neononanoic acid, neodecanoic acid, neotridecanoic acid, stearic acid, myristic acid, palmitic acid, linolic acid, linoleic acid, oleic acid, lauric acid, acrylic acid, methacrylic acid, crotonic acid, cinnamic acid, and mixtures thereof.

7. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is a C_4 to C_{22} linear saturated or unsaturated monocarboxylic acid selected from the group consisting of butyric acid, valeric acid, caproic acid, enanthic acid, caprylic acid, pelargonic acid, capric acid, undecylic acid, lauric acid, myristic acid, tridecylic acid, pentadecanoic acid, palmitic acid, margaric acid, stearic acid, arachidic acid, behenic acid, myristoleic acid, oleic acid, arachidonic acid, linoleic acid, and mixtures thereof.

8. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is an aromatic monocarboxylic acid selected from the group consisting of benzoic acid, nitrobenzoic acid, monohydroxybenzoic acid such as salicylic, 3-hydroxybenzoic acid and 4-hydroxybenzoic acid, alkylhydroxybenzoic acid, chlorobenzoic acid, methoxybenzoic acid, t-butyl benzoic acid, methylbenzoic acid, phenyl acetic acid, 3-phenyl propionic acid, 4-phenyl butyric acid, 3-(p-chlorophenyl) butanoic acid, and mixtures thereof.

9. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is an aliphatic dicarboxylic acid selected from the group consisting of oxalic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid, malonic acid, succinic acid, glutaric acid, adipic acid, maleic acid and fumaric acid.

10. The process according to Claim 4, wherein the saturated or unsaturated carboxylic acid is an aromatic dicarboxylic acid selected from the group consisting of phthalic acid, terephthalic acid, isophthalic acid, 1,5-naphthalene dicarboxylic acid, 1,4-naphthalene dicarboxylic acid, 1,8-naphthalene

dicarboxylic acid, 2,8-naphthalene dicarboxylic acid, 2,6-naphthalene dicarboxylic acid, traumatic acid, muconic acid, and mixtures thereof.

11. The process of Claim 4, wherein the saturated or unsaturated carboxylic acid is a tricarboxylic acid selected from the group consisting of citric acid, isocitric acid, aconitic acid (unsaturated), carbalyllic acid mellitic (benzenehexacarboxylic) acid, and mixtures thereof.

12. The process according to Claims 1-3, wherein the acidic compound is a polyalkenyl succinic acid or anhydride thereof or an aliphatic sulfonic acid, aromatic sulfonic acid or mixtures thereof or an amine or ammonium salt.

13. The process according to Claims 1-14, wherein the effective amount of the acidic compound is from 1 wt. % to 25 wt. %, based on the total amount of the neutral or overbased salt of a sulfurized alkyl-substituted hydroxyaromatic composition.

14. The process according to Claims 1-13, wherein the step of removing the unsulfurized alkyl-substituted hydroxyaromatic compound and the protonated unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound from the composition comprises distilling the unsulfurized alkyl-substituted hydroxyaromatic compound and the protonated unsulfurized metal salt of the alkyl-substituted hydroxyaromatic compound from the composition of step (b).

15. The process according to Claims 1-14, wherein the salt of the sulfurized alkyl-substituted hydroxyaromatic composition obtained in step (c) contains less than 1.5 wt. % of the unsulfurized alkyl-substituted hydroxyaromatic compound and its metal salt or less than 0.3 wt. % of the unsulfurized alkyl-substituted hydroxyaromatic compound and its metal salt.