CLAIMS

1. A sulfurized alkyl phenate comprising a polyalphaolefin substituted bridged hydroxyaromatic compound or salt thereof, wherein the polyalphaolefin is derived from one or more C6 to C14 monomers forming an oligomer in the form of a dimer, a trimer, a tetramer, a pentamer or combinations thereof, or copolymers of the oligomer, copolymer variants of the oligomer, or combinations thereof; and wherein about 40 mol percent or greater of the polyalphaolefin includes a carbon atom configured to form a tertiary carbocation positioned to react with the hydroxyaromatic compound at the para-position.

2. The sulfurized alkyl phenate of claim 1, wherein at least one alkyl group adjacent the tertiary carbocation is an alkyl group having 1, 2, or 3 carbon atoms.

3. The sulfurized alkyl phenate of claim 1, wherein the polyalphaolefin is obtained from one or more C8 to C12 monomers forming the oligomer in the form of the dimer, the trimer, the tetramer, the pentamer, or combinations thereof.

4. The sulfurized alkyl phenate of claim 1, wherein about 50 mol percent or greater of the polyalphaolefin includes a carbon atom configured to form a tertiary carbocation.

5. The sulfurized alkyl phenate of claim 1, wherein the polyalphaolefin contains vinylidene olefins, trisubstituted olefins, or mixtures thereof.

6. The sulfurized alkyl phenate of claim 5, wherein the polyalphaolefin contains greater than about 40 mol percent of the vinylidene olefins, the trisubstituted olefins, or mixtures thereof.

7. The sulfurized alkyl phenate of claim 5, wherein the polyalphaolefin is a trisubstituted olefin and includes about 40 weight percent or more of the dimer.

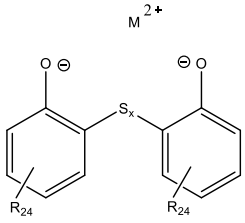
8. The sulfurized alkyl phenate of claim 7, wherein the polyalphaolefin includes about 40 weight percent or less of the trimer; and/or about 20 weight percent or less of the tetramer; and/or about 5 weight percent or less of the pentamer.

9. The sulfurized alkyl phenate of claim 1, wherein the polyalphaolefin contains predominately vinylidene olefins, trisubstituted olefins, or mixtures thereof and includes about 40 weight percent or more of the C3 or shorter alkyl group adjacent the tertiary carbocation.

10. The sulfurized alkyl phenate of claim 1, wherein the polyalphaolefin includes double bonds having a vinylidene structure and/or a tri-substituted structure.

11. The sulfurized alkyl phenate of claim 1, wherein the polyalphaolefin includes about 40 mol percent or more of a vinylidene olefin, a tri-substituted olefin, or combinations thereof.

12. A detergent composition including a sulfurized alkyl phenate having a structure of Formula IX:



(Formula IX)

wherein

each R_{24} independently, is a polyalphaolefin derived from one or more C6 to C14 monomers forming an oligomer in the form of a dimer, a trimer, a tetramer, a pentamer, or combinations thereof, or copolymers of the oligomer, copolymer variants of the oligomer, or combinations thereof including a residue of a tertiary carbocation forming the bond to the aromatic ring, wherein at least 50 mol percent of R_{24} is bonded to the aromatic ring at the para-position; wherein each R_{24}, independently, has about 40 weight percent or more of at least one alkyl group adjacent the tertiary carbocation having 1, 2, or 3 carbon atoms;

x is an integer from 1 to 4; and

M^{2+} is a divalent metal ion.

13. The detergent composition of claim 12, wherein each R_{24}, independently, is formed from one or more C8 to C12 monomers forming the oligomer in the form of the dimer, the trimer, the tetramer, the pentamer, or combination thereof.

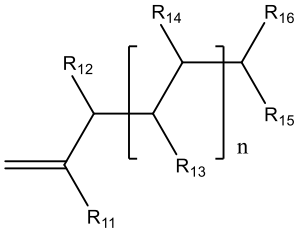
14. The detergent composition of claim 12, wherein R_{24} is derived from vinylidene olefins, trisubstituted olefins, or mixtures thereof.

15. The detergent composition of claim 14, wherein the R_{24} contains about 40 mol percent or greater of the vinylidene olefins, the trisubstituted olefins, or mixtures thereof.

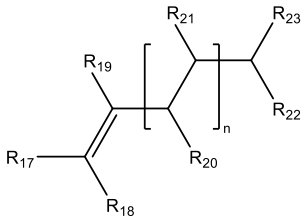
16. The detergent composition of claim 14, wherein the R_{24} is a trisubstituted olefin and about 40 weight percent or more of R_{24} is a dimer.

17. The detergent composition of claim 16, wherein about 40 weight percent or less of R_{24} is a trimer, about 20 weight percent or less of R_{24} is a tetramer, and/or about 5 weight percent or less of R_{24} is a pentamer.

18. The detergent composition of claim 12, wherein the R_{24} group is derived from a mixture of oligomers and a majority of oligomers in the mixture have the structure of Formula VI and/or Formula VII below:



(Formula VI)



(Formula VII)

wherein

R_{11} is an alkyl group;

each of R_{12}, R_{13}, R_{14}, R_{15}, and/or R_{16}, is the same or different at each occurrence, and independently represents a hydrogen or a substituted or unsubstituted hydrocarbyl group;

only one of R_{17}, R_{18} and R_{19} is hydrogen and one of the remaining two of R_{17}, R_{18} and R_{19}

is a substituted or unsubstituted hydrocarbyl group having 1, 2, or 3 carbons and the other of the remaining two of R_{17}, R_{18} and R_{19} is a substituted or unsubstituted hydrocarbyl group;

each of R_{20}, R_{21}, R_{22}, and/or R_{23}, is the same or different at each occurrence, and independently represents a hydrogen or a substituted or unsubstituted hydrocarbyl group;

each n is, independently, an integer of 0 to 3.

19. A lubricating oil composition including the sulfurized alkyl phenate of claim 1 and one or more base oils of lubricating viscosity.

20. A lubricating oil composition including the detergent composition of claim 12 and one or more base oils of lubricating viscosity.