TITLE

Low Ash Lubricants with Improved Seal and Corrosion Performance

BACKGROUND OF THE INVENTION

[0001] The disclosed technology relates to lubricants, particularly for internal combustion engines including diesel engines, exhibiting good seal performance and corrosion performance in a low ash formulation.

[0002] Lubricants for internal combustion engines are well known. For example, U.S. Patent 6,444,624, Walker et al., September 3, 2002, discloses a lubricating oil composition containing 0 to less than 10% Group I and/or Group II basestocks, a molybdenum additive providing not greater than 1000 ppm of molybdenum to the lubricant, a calcium detergent providing 10 or greater mmoles of surfactant per kilogram of lubricant, one or more other lubricant additives selected from, among others, ashless dispersants, and a viscosity modifier.

[0003] US Patent 7,361,629, Loper et al., April 22, 2008, discloses an amination product of a hydrocarbyl-substituted succinic acylating agent and a mixture containing an aliphatic polyamine and an aromatic polyamine. Among the aromatic polyamines disclosed is N-phenyl-1,4-phenylenediamine.

[0004] US Patent 4,863,623, Nalesnik, September 5, 1989, discloses an additive composition comprising a graft and amine-derivatized copolymer. It discloses an amino-aromatic polyamine compound from the group consisting of, among others, an N-arylphenylenediamine. A lubricating oil composition containing the same is also provided.

[0005] The disclosed technology solves the problems of corrosion and seal degradation in low ash engine lubricants by employing a combination of additives as described herein.

SUMMARY OF THE INVENTION

The disclosed technology provides a lubricant composition comprising: (a) an oil of lubricating viscosity; (b) 0.6 to 6 percent by weight of a dispersant comprising the condensation product of a carboxylic functionalized polymer with an aromatic amine having at least 3 aromatic rings and at least one primary or secondary amino group; wherein the carboxylic functionalized polymer comprises a polyisobutylene of number average molecular weight of 500 to 10,000 bearing at least one succinic anhydride group; and (c) an overbased metal detergent comprising an oil-soluble neutral metal salt component and a metal carbonate component; wherein the total amount of neutral metal salt component ~~(from the overbased detergent)~~ in the lubricant composition is at least 0.75 percent by weight ~~(of the composition)~~ and wherein the sulfated ash level of the lubricant composition is less than 1.1 percent.

What is claimed is:

1. A lubricant composition comprising:

(a) an oil of lubricating viscosity;

(b) 0.6 to 6 percent by weight of a dispersant comprising the condensation product of a carboxylic functionalized polymer with an aromatic amine having at least 3 aromatic rings and at least one primary or secondary amino group; wherein the carboxylic functionalized polymer comprises a polyisobutylene of number average molecular weight of 500 to 10,000 bearing at least one succinic anhydride group; and

(c) an overbased metal detergent comprising an oil-soluble neutral metal salt component and a metal carbonate component;

wherein the total amount of neutral metal salt component in the lubricant composition is at least 0.75 percent by weight and wherein the sulfated ash level of the lubricant composition is less than 1.1 percent.

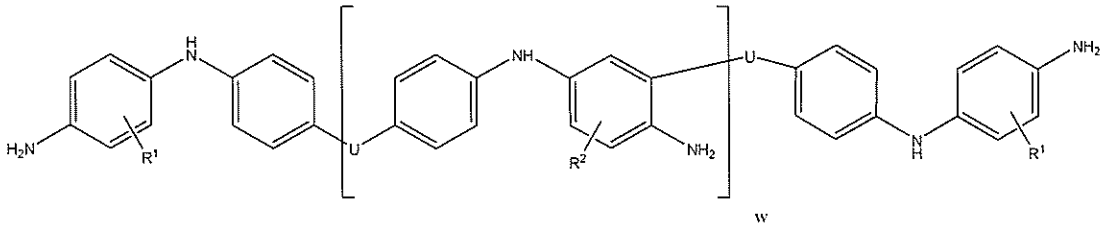
2. The lubricant composition of claim 1 wherein the sulfated ash level of the lubricant is less than 1.0 percent.

~~3. The lubricant composition of claim 1 or claim 2 wherein the carboxylic functionalized polymer comprises a polyisobutylene of number average molecular weight of 500 to 10,000 bearing at least one succinic anhydride group.~~

~~4~~3. The lubricant composition of ~~any one of~~ claims 1 ~~to 3~~or claim 2 wherein the dispersant comprises the condensation product of a carboxylic functionalized polymer with an aromatic amine having multiple aromatic groups, at least one secondary or tertiary amino group, and at least one nitrogen functional group which provides linkage to the carboxylic functionalized polymer.

~~5~~4. The lubricant composition of any one of claims 1 to ~~3~~4 wherein the aromatic amine comprises at least 4 aromatic groups and at least 2 secondary or tertiary amino groups.

~~6~~5. The lubricant composition of any one of claims 1 to ~~5~~4 wherein the aromatic amine is represented by the structure



wherein independently each variable

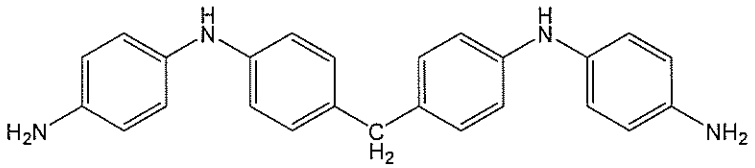
R^1 and R^2 are hydrogen or C_{1-5} alkyl groups;

U is an aliphatic, alicyclic, or aromatic group; and

w is zero to 9.

67. The lubricant composition of claim 56 wherein, when U is an aliphatic group, U is an alkylene group containing 1 to 5 carbon atoms.

78. The lubricant composition of any one of claims 1 to 67 wherein the aromatic amine comprises material represented by the structure



89. The lubricant composition of any one of claims 1 to 78 wherein the ovebased metal detergent comprises an overbased, carbonated, calcium or magnesium sulfonate, phenate, salicylate, saligenin, or salixarate detergent.

910. The lubricant composition of any one of claims 1 to 79 wherein the overbased metal detergent comprises an overbased carbonated magnesium saligenin detergent.

1011. The lubricant composition of any one of claims 1 to 910 wherein the amount of the overbased metal detergent is 1.3 to 5 percent by weight.

1112. The lubricant composition of any one of claims 1 to 1011 wherein the total amount of neutral metal salt component in the lubricant composition is at least 1.0 percent.

1213. A lubricant composition prepared by admixing the components of any one of claims 1 to 1112.

1314. A method for lubricating an internal combustion engine, comprising supplying thereto the lubricant composition of any one of claims 1 to 1213.

1415. The method of claim 1315 wherein the internal combustion engine is a diesel engine.