a. a nitrogen containing reactant, wherein the nitrogen containing reactant comprises an alkyl di-alkanolamide, an alkyl di-alkanolamine, or mixtures thereof,

b. an acidic molybdenum compound; and

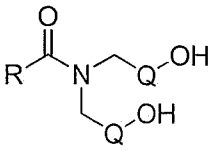
c. a salicylate compound.

Also provided is a method for operating an internal combustion engine comprising said lubricating composition and a method for preparing a molybdenum containing friction modifier.

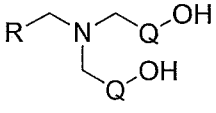
Another aspect of the disclosure relates to a lubricating oil composition comprising: (a) a major amount of base oil of lubricating viscosity; and (b) the reaction product of: (i) a nitrogen containing reactant, wherein the nitrogen containing reactant comprises an alkyl di-alkanolamide, an alkyl di-alkanolamine, or mixtures thereof, (ii) an acidic molybdenum compound; and (iii) a salicylate compound.

Another aspect relates to a method for operating an internal combustion engine comprising lubricating said engine with a lubricating oil composition comprising (a) a major amount of base oil of lubricating viscosity; and (b) the reaction product of: (i) a nitrogen containing reactant, wherein the nitrogen containing reactant comprises an alkyl di-alkanolamide, an alkyl di-alkanolamine, or mixtures thereof, (ii) an acidic molybdenum compound; and (iii) a salicylate compound.

Another aspect relates to a method for preparing an molybdenum containing friction modifier comprising, forming a aqueous reaction mixture comprising: (a) a nitrogen containing reactant comprising a compound having the formula (I) and/or formula (III),



(Formula I),

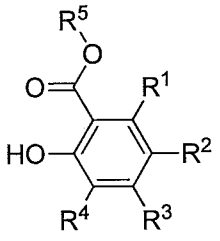


(Formula III),

wherein each R individually comprises 1 to 30 carbon atoms and Q is a C_1 to C_4 linear or branched alkylene group,

(b) an acidic molybdenum compound; and

(c) a salicylate compound having the formula (V);



(Formula V),

wherein R^1, R^2, R^3, and R^4 are each independently selected from the group consisting of: hydrogen atom, C_1-C_{40} alkyl group, carbocyclic group, heterocyclic group, nitro group, alkoxy group, hydroxy group, nitrile group, thiol group, amide group, amino group, keto group, and ester group; R^5 is a hydrogen atom or C_1-C_{18} alkyl group; for a time and temperature sufficient to form said molybdenum containing friction modifier.

DEFINITIONS

[0012] Prior to discussing the invention in further detail, the following terms will be defined. As used herein, the following terms have the following meanings, unless expressly stated to the contrary.

[0013] The term "a major amount" of a base oil refers to where the amount of the base oil is at least 40 wt. % of the lubricating oil composition. In some embodiments, "a major amount" of a base oil refers to an amount of the base oil more than 50 wt.%, more than 60 wt.%, more than 70 wt.%, more than 80 wt.%, or more than 90 wt.% of the lubricating oil composition.

[0014] In the following description, all numbers disclosed herein are approximate values, regardless whether the word "about" or "approximate" is used in connection therewith. They may vary by 1 percent, 2 percent, 5 percent, or, sometimes, 10 to 20 percent.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] In an aspect, the present invention provides a molybdenum containing friction modifier. In an embodiment, the invention provides a composition comprising the reaction product of a (a) nitrogen containing reactant, wherein the nitrogen containing reactan