acid amides, phosphonoamides, thiophosphonoamides, Mannich bases, and hydrocarbonpolyamines.

King et al., U.S. Pat. No. 4,263,152; King et al., U.S. Pat. No. 4,261,843; and King et al., U.S. Pat. No. 4,259,195 teach molybdenum compounds used as anti-oxidant and anti-wear additives comprising an acidic molybdenum compound and a basic nitrogen compound which acts as a dispersant.

DeVries et al., U.S. Pat. No. 4,259,194 discloses a sulfur containing additive comprising the reaction product of ammonium tetrathiomolybdate and a basic nitrogen compound for use as an anti-oxidant, anti-wear agent, and friction modifier.

Nemo, U.S. Pat. No. 4,705,643 teaches the preparation of carboxylic acid amides as detergent additives in lubricating oils.

Udding et al., U.S. Pat. No. 5,468,891 describes antifriction additives for lubricating oils comprising a molybdenum-containing complex prepared by reacting an alkaline earth metal salt of a carboxylic acid, an amine and a source of cationic molybdenum, wherein the ratio of the number of equivalents of acid groups to the number of moles of molybdenum (eq:mol) is in the range from 1:10 to 10:1, and the ratio of the number of equivalents of acid groups to the number of moles of amine (eq:mol) is in the range from 20:1 to 1:10.

Ruhe, Jr. et al., U.S. Pat. No. 6,962,896 describes antioxidant additives for lubricating oils comprising low color molybdenum compounds.

Gatto et al., U.S. Pat No. 6,174,842 discloses a lubricating oil composition comprising a lubricating oil, an oil-soluble molybdenum compound substantially free of reactive sulfur, an oil-soluble diarylamine and a calcium phenate as an anti-wear and anti-oxidant additive.

SUMMARY OF THE ~~INVENTION~~DISCLOSURE

In one embodiment, the ~~invention~~disclosure is directed to an oil soluble additive composition comprising a salt or complex of (i) a molybdenum component which comprises a molybdenum oxide, sulfide, or oxysulfide of the general formula MoO_xS_y wherein $x \geq 0$, $y \geq 0$, and $12 \geq (x+y) \geq 2$; and (ii) an imide wherein said imide comprises the reaction product of at

least one dicarboxylic acid component having from about 8 to about 22 carbon atoms, and at least one nitrogen compound selected from ammonia and a polyamine.

In one embodiment, there is provided an oil soluble additive composition comprising a salt or complex of

(i) a molybdenum component which comprises a molybdenum oxide, sulfide, or oxysulfide of the general formula MoO_xS_y wherein $x \geq 0$, $y \geq 0$, and $12 \geq (x+y) \geq 2$;

(ii) a hydrocarbyl succinimide, wherein said hydrocarbyl succinimide comprises the reaction product of at least one hydrocarbyl succinic anhydride having from about 12 to about 18 carbon atoms in the hydrocarbyl group, and at least one nitrogen compound selected from ammonia and a polyamine; and

(iii) wherein the salt or complex is sulfurized.

In one embodiment, the ~~invention~~disclosure is directed to a lubricating oil composition comprising an oil of lubricating viscosity and an oil soluble additive composition comprising a salt or complex of: (i) a molybdenum component which comprises a molybdenum oxide, sulfide, or oxysulfide of the general formula MoO_xS_y wherein $x \geq 0$, $y \geq 0$, and $12 \geq (x+y) \geq 2$; and (ii) an imide wherein said imide comprises the reaction product of at least one dicarboxylic acid component, having from about 8 to about 22 carbon atoms, and at least one nitrogen compound selected from ammonia and a polyamine.

In one embodiment, there is provided a lubricating oil composition comprising:

(1) an oil of lubricating viscosity and

(2) an oil soluble additive composition comprising a salt or complex of:

(i) a molybdenum component which comprises a molybdenum oxide, sulfide, or oxysulfide of the general formula MoO_xS_y wherein $x \geq 0$, $y \geq 0$, and $12 \geq (x+y) \geq 2$;

(ii) a hydrocarbyl succinimide, wherein said hydrocarbyl succinimide comprises the reaction product of at least one hydrocarbyl succinic anhydride, having from about 12 to about 18 carbon atoms in the hydrocarbyl group, and at least one nitrogen compound selected from ammonia and a polyamine; and

(iii) wherein the salt or complex is sulfurized.

In one embodiment, the ~~invention~~disclosure is directed to a process for preparing an oil soluble additive composition which comprises reacting (i) a molybdenum component which is, or is capable of forming, a molybdenum oxide, sulfide, or oxysulfide of the general formula MoO_xS_y wherein $x \geq 0$, $y \geq 0$, and $12 \geq (x+y) \geq 2$; (ii) an imide which comprises the reaction product of a at least one dicarboxylic acid component having from about 8 to about 22 carbon atoms, and at least one nitrogen compound selected from ammonia and a polyamine component.

In an embodiment, there is provided a process for preparing an oil soluble additive composition which comprises reacting:

(i) a molybdenum component which is, or is capable of forming, a molybdenum oxide, sulfide, or oxysulfide of the general formula MoO_xS_y wherein $x \geq 0$, $y \geq 0$, and $12 \geq (x+y) \geq 2$;

(ii) a hydrocarbyl succinimide, wherein said hydrocarbyl succinimide comprises the reaction product of a at least one hydrocarbyl succinic anhydridehaving from about 12 to about 18 carbon atoms in the hydrocarbyl group, and at least one nitrogen compound selected from ammonia and a polyamine component; and

(iii) wherein the product obtained from the reaction of step (i) and step (ii) is sulfurized.

DETAILED DESCRIPTION OF THE INVENTION

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof and are herein described in detail. It should be understood, however, that the description herein of specific embodiments is not intended to limit the invention to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

Definitions

The following terms will be used throughout the specification and will have the following meanings unless otherwise indicated.

The term "polyamines" refers to organic compounds containing more than one basic nitrogen. The organic portion of the compound may contain aliphatic, cyclic, or aromatic carbon atoms.