of the lubricant. It is therefore desirable to provide engine oil lubricants and methods of using the same that at least partially mitigate these and possibly other adverse effects of the use of biodiesel fuels.

SUMMARY AND TERMS

[0005a] In one aspect of the present disclosure, there is provided a lubricant composition comprising:
greater than 50 percent by weight of a base oil, based on a total weight of the lubricant composition;

a dispersant composition ~~comprising~~consisting of:

i) optionally a first dispersant ~~(A) comprising~~consisting of one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group, ~~with~~ the polyisobutenyl group having a number average molecular weight that is less than or equal to 1300, and at least one polyamine; and

ii) a second dispersant ~~comprising dispersants (B) and (C), each independently comprising one~~consisting of two or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group, ~~with~~ the polyisobutenyl group having a number average molecular weight greater than 1300, and at least one polyamine; and

at least one antioxidant substantially free of copper and selected from the group consisting of sulfurized antioxidant, a phenolic antioxidant, and an aminic antioxidant, and comprising the phenolic antioxidant and the aminic antioxidant in a weight ratio of from 0.3:0.8 to 0.7:0.8 or a phenolic antioxidant, an aminic antioxidant, and a molybdenum-containing antioxidant in a weight ratio of approximately 0.5:1:0.1;

further defined by the following ratios (a) and (b):

~~at least one ashless antioxidant;~~

~~wherein~~ a weight ratio of the ~~combined amounts of dispersants (B) and (C) to the total weight of~~second dispersant to the dispersant composition ranges from 0.42:1 to 1:1;

(b) a ratio of the weight percentage of nitrogen contributed by the second dispersant to the weight percentage of nitrogen of the dispersant composition is from 0.40:1 to 1:l;

with the proviso that if the at least one antioxidant substantially free of copper does not comprise a molybdenum-containing antioxidant, then ratio (a) ranges from 0.66:1 to ~~less than~~ 1:1 and ratio (b) ranges from 0.62:1 to 1:1.

[0005b] In another aspect of the present disclosure, there is provided a method of lubricating an engine fueled with biodiesel, the method comprising supplying the lubricant composition disclosed herein to the engine wherein the lubricant composition is contaminated with the biodiesel during operation of the engine.

~~**[0005c]** In a further aspect of the present disclosure, there is provided a lubricant composition comprising:
greater than 50 percent by weight of a base oil, based on a total weight of the lubricant composition;~~

a dispersant composition comprising:

i) dispersant (A) comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight that is less than or equal to 1300, and at least one polyamine; and

ii) a second dispersant comprising dispersants (B) and (C) each independently comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight greater than 1300, and at least one polyamine; and

at least one ashless antioxidant;

wherein a ratio of the weight percentage of nitrogen contributed by the second dispersant to the weight percentage of nitrogen of the dispersant composition is from 0.62:1 to less than 1:1.

~~**[0005d]** In another aspect of the present disclosure, there is provided a lubricant composition comprising:~~
~~greater than 50 percent by weight of a base oil, based on a total weight of the lubricant composition;~~
~~at least one antioxidant substantially free of copper; and~~
~~a dispersant composition comprising:~~
~~i) dispersant (A) comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight that is less than or equal to 1300, and at least one polyamine; and~~
~~ii) a second dispersant comprising dispersants (B) and (C) each independently comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight greater than 1300, and at least one polyamine;~~
~~wherein a weight ratio of the second dispersant to the dispersant composition ranges from 0.42:1 to less than 1:1.~~
~~**[0005e]** In a further aspect of the present disclosure, there is provided a lubricant composition comprising:~~
~~greater than 50 percent by weight of a base oil, based on a total weight of the lubricant composition;~~
~~at least one antioxidant substantially free of copper; and~~
~~a dispersant composition comprising:~~
~~i) dispersant (A) comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight that is less than or equal to 1300, and at least one polyamine; and~~
~~ii) a second dispersant comprising dispersants (B) and (C) each independently comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight greater than 1300, and at least one polyamine;~~
~~wherein a ratio of the weight percentage of nitrogen contributed by the second dispersant to the weight percentage of nitrogen of the dispersant composition is from 0.40:1 to less than 1:1.~~

[0005~~f~~c] In another aspect of the present disclosure, there is provided a use of a lubricant composition as disclosed herein for improving or maintaining soot or sludge handling characteristics and piston cleanliness, while improving oxidation stability~~method of lubricating an engine fueled with biodiesel, the method comprising supplying the lubricant composition disclosed herein to the engine wherein the lubricant composition is contaminated with the biodiesel during operation of the engine~~.

[0006] The present disclosure also relates to a lubricant composition and method of lubricating an engine fueled with biodiesel, with this lubricant composition. The present disclosure is a lubricant composition comprising:

greater than 50 percent by weight of a base oil, based on a total weight of the lubricant composition;

a dispersant composition comprising:

CLAIMS

1. A lubricant composition comprising:

greater than 50 percent by weight of a base oil, based on a total weight of the lubricant composition;

a dispersant composition ~~comprising~~consisting of:

i) optionally a first dispersant ~~(A) comprising~~consisting of one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group ~~with~~, the polyisobutenyl group having a number average molecular weight that is less than or equal to 1300, and at least one polyamine; and

ii) a second dispersant ~~comprising dispersants (B) and (C), each independently comprising one~~consisting of two or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group, ~~with~~the polyisobutenyl group having a number average molecular weight greater than 1300, and at least one polyamine; and

at least one antioxidant substantially free of copper and selected from the group consisting of sulfurized antioxidant, a phenolic antioxidant, and an aminic antioxidant, and comprising the phenolic antioxidant and the aminic antioxidant in a weight ratio of from 0.3:0.8 to 0.7:0.8 or a phenolic antioxidant, an aminic antioxidant, and a molybdenum-containing antioxidant in a weight ratio of approximately 0.5:1:0.1;

further defined by the following ratios (a) and (b):

(a) ~~at least one ashless antioxidant;~~

~~wherein~~ a weight ratio of the ~~combined amounts of dispersants (B) and (C) to the total weight of~~second dispersant to the dispersant composition ranges from 0.42:1 to 1:1;

(b) a ratio of the weight percentage of nitrogen contributed by the second dispersant to the weight percentage of nitrogen of the dispersant composition is from 0.40:1 to 1:1;

with the proviso that if the at least one antioxidant substantially free of copper does not comprise a molybdenum-containing antioxidant, then ratio (a) ranges from 0.66:1 to ~~less than~~ 1:1 and ratio (b) ranges from 0.62:1 to 1:1.

~~2. The lubricant composition of claim 1, wherein the ashless antioxidant comprises at least one of a sulfurized antioxidant, a phenolic antioxidant, and an aminic antioxidant.~~

~~3. The lubricant composition of claim 1, further comprising a molybdenum containing compound.~~

~~4. The lubricant composition of claim 2, wherein the antioxidant comprises the phenolic antioxidant and the aminic antioxidant in a ratio of from 0.3:0.8 to 0.7:0.8.~~

~~5~~2. The lubricant composition of claim 1, wherein a ratio of the number average molecular weight of the ~~combined amounts of dispersants (B) and (C)~~second dispersant to the number average molecular weight of the ~~total~~ dispersant composition is from 0.5:1 to 1:1, preferably from 0.72:1 to less than 1:1.

~~6~~3. The lubricant composition of claim 1 or 2, wherein the ~~dispersants (B) and (C) each independently comprise~~second dispersant comprises at least one dispersant obtained from a polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight ~~greater than~~between 1300 ~~to~~ and 2300.

~~7~~4. The lubricant composition of ~~claim 1~~any one of claims 1 to 3, wherein the ~~combined amounts of dispersants (B) and (C) is from~~second dispersant comprises 0.1 wt.% to 10 wt.%, based on the total weight of the lubricant composition.

~~8~~5. The lubricant composition of ~~claim 1~~any one of claims 1 to 4, wherein the total dispersant comprises ~~from~~ 0.1 wt.% to 20 wt.%, based on the total weight of the lubricant composition.

~~9~~6. A method of lubricating an engine fueled with biodiesel, the method comprising supplying the lubricant composition of ~~claim 1~~any one of claims 1 to 5 to the engine wherein the lubricant composition is contaminated with the biodiesel during operation of the engine.

7. Use of a lubricant composition according to any one of claims 1 to 5 for improving or maintaining soot or sludge handling characteristics and piston cleanliness, while improving oxidation stability.

~~10. A lubricant composition comprising:~~

~~greater than 50 percent by weight of a base oil, based on a total weight of the lubricant composition;~~

~~a dispersant composition comprising:~~

~~i) dispersant (A) comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight that is less than or equal to 1300, and at least one polyamine; and~~

~~ii) a second dispersant comprising dispersants (B) and (C) each independently comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight greater than 1300, and at least one polyamine; and~~

~~at least one ashless antioxidant;~~

~~wherein a ratio of the weight percentage of nitrogen contributed by the second dispersant to the weight percentage of nitrogen of the dispersant composition is from 0.62:1 to less than 1:1.~~

~~11. The lubricant composition of claim 10, wherein the total dispersant comprises from 0.1 wt.% to 20 wt.%, based on the total weight of the lubricant composition.~~

~~12. A lubricant composition comprising:~~
~~greater than 50 percent by weight of a base oil, based on a total weight of the lubricant composition;~~
~~at least one antioxidant substantially free of copper; and~~
~~a dispersant composition comprising:~~
~~i) dispersant (A) comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight that is less than or equal to 1300, and at least one polyamine; and~~
~~ii) a second dispersant comprising dispersants (B) and (C) each independently comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight greater than 1300, and at least one polyamine;~~
~~wherein a weight ratio of the second dispersant to the dispersant composition ranges from 0.42:1 to less than 1:1.~~

~~13. The lubricant composition of claim 12, wherein the antioxidant comprises a phenolic antioxidant, an aminic antioxidant, and a molybdenum-containing antioxidant in a ratio of approximately 0.5:1:0.1.~~

~~14. The lubricant composition of claim 12, wherein a ratio of the number average molecular weight of the combined amounts of dispersants (B) and (C) to the number average molecular weight of the total dispersant composition is from 0.5:1 to less than 1:1.~~

~~15. The lubricant composition of claim 12, wherein dispersant (B) comprises at least one dispersant obtained from a polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight greater than 1300 to 2300.~~

~~16. The lubricant composition of claim 15, wherein the second dispersant comprises from 0.1 wt.% to 10 wt.%, based on the total weight of the lubricant composition.~~

~~17. The lubricant composition of claim 12, wherein the total dispersant comprises from 0.1 wt.% to 20 wt.%, based on the total weight of the lubricant composition.~~

~~18. A lubricant composition comprising:~~
~~greater than 50 percent by weight of a base oil, based on a total weight of the lubricant composition;~~
~~at least one antioxidant substantially free of copper; and~~
~~a dispersant composition comprising:~~

i) a first dispersant (A) comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight that is less than or equal to 1300, and at least one polyamine; and

ii) a second dispersant comprising dispersants (B) and (C) each independently comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight greater than 1300, and at least one polyamine;

wherein a ratio of the weight percentage of nitrogen contributed by the second dispersant to the weight percentage of nitrogen of the dispersant composition is from 0.40:1 to less than 1:1.

19. A method of lubricating an engine fueled with biodiesel, the method comprising supplying the lubricant composition of claim 10 to the engine wherein the lubricant composition is contaminated with the biodiesel during operation of the engine.

LUBRICANT COMPOSITION AND DISPERSANTS THEREFOR HAVING A BENEFICIAL EFFECT ON OXIDATION STABILITY

ABSTRACT

A lubricant composition having greater than 50 percent by weight of a base oil, a dispersant composition comprising: i) optionally a first dispersant comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight that is less than or equal to 1300, and at least one polyamine; and ii) a second dispersant comprising one or more reaction products of at least one polyisobutenyl succinic acid or anhydride having a polyisobutenyl group with a number average molecular weight greater than 1300, and at least one polyamine; and at least one ashless antioxidant; and wherein a weight ratio of the second dispersant to the dispersant composition is 0.66:1 to 1:1 or a ratio of the weight percentages of nitrogen contributed by the second dispersant to nitrogen of the dispersant composition is 0.62:1 to 1:1.

[NO DRAWING]