CLAIMS

1. A lubricating oil composition comprising:

a base oil;

a primary antioxidant comprising alkylated diphenylamines having an alkyl group derived from a propylene tetramer;

a secondary antioxidant comprising a dithiocarbamate, a hindered phenol, or a molybdenum succinimide;

and

a carboxylate detergent.

2. The lubricating oil composition of claim 1, wherein at least 50% of the alkyl group of the alkylated diphenylamine have a carbon number between 10 and 15 .

3. The lubricating oil composition of claim 1, wherein the carboxylate detergent is:

(a) an aromatic carboxylate or an aliphatic carboxylate, or

(b) a salicylate, a naphthenate, or a stearate, or

(c) low overbased with a TBN from 15 to 30, medium overbased with a TBN from 31 to 170, high overbased with a TBN from 171 to 400 or high high overbased with a TBN >400, or

(d) present in 0.01 wt % to 10 wt % of the lubricating oil composition.

4. The lubricating oil composition of claim 1, wherein the primary antioxidant is present in 0.4 wt % to 20 wt % of the lubricating oil composition.

5. The lubricating oil of claim 1, wherein the secondary antioxidant is present in 0.01 wt % to 20 wt % of the lubricating oil composition.

6. The lubricating oil composition of claim 1, further comprising:

an antioxidant, an ashless dispersant, an anti-wear agent, a detergent, a rust inhibitor, a dehazing agent, a demulsifying agent, a friction modifier, a metal deactivating agent, a pour point depressant, a viscosity modifier, an antifoaming agent, a co-solvent, a package compatibilizer, a corrosion-inhibitor, a dye, or an extreme pressure agent.

7. A method of improving oxidation stability of a lubricating oil, the method comprising:

supplying to an engine a lubricating oil composition comprising:

a major amount of a base oil;

a primary antioxidant comprising alkylated diphenylamines having an alkyl group comprising a propylene tetramer;

a secondary antioxidant comprising a dithiocarbamate, a hindered phenol, or a molybdenum succinimide; and

a carboxylate detergent.

8. The method of claim 7, wherein at least 50% of the alkyl group of the alkylated diphenylamine have a carbon number between 10 and 15.

9. The method of claim 7, wherein the carboxylate detergent is:

(a) an aromatic carboxylate or an aliphatic carboxylate, or

(b) a salicylate, a naphthenate, or a stearate, or

(c) low overbased with a TBN from 15 to 30, medium overbased with a TBN from 31 to 170, high overbased with a TBN from 171 to 400 or high high overbased with a TBN >400, or

(d) present in 0.01 wt % to 10 wt % of the lubricating oil composition.

10. The method of claim 7, wherein the primary antioxidant is present in 0.4 wt % to 20 wt % of the lubricating oil composition.

11. The method of claim 7, wherein the secondary antioxidant is present in 0.01 wt % to 20 wt % of the lubricating oil composition.

12. The method of claim 7, wherein the lubricating oil composition further comprises:

an antioxidant, an ashless dispersant, an anti-wear agent, a detergent, a rust inhibitor, a dehazing agent, a demulsifying agent, a friction modifier, a metal deactivating agent, a pour point depressant, a viscosity modifier, an antifoaming agent, a co-solvent, a package compatibilizer, a corrosion-inhibitor, a dye, or an extreme pressure agent.