CLAIMS

1. A lubricating oil composition having a sulphated ash content of less than 0.6 mass % as determined by ASTM D874, the composition comprising:

(A) an oil of lubricating viscosity in a major amount;

(B) an antioxidant component, as an additive in a minor amount, comprising an oil-soluble or oil-dispersible ashless aromatic amine antioxidant present in an amount of at least 0.75 mass %, based on the total mass of the lubricating oil composition; and,

(C) a detergent component, as an additive in a minor amount, comprising an oil-soluble or oil-dispersible overbased magnesium detergent providing the lubricating oil composition with at least 0.05 mass % of magnesium, based on the total mass of the lubricating oil composition, wherein greater than 45 mass % of the metal content of the detergent component (C), based on the total mass of metal in the detergent component, comprises magnesium derived from the overbased magnesium detergent.

2. A lubricating oil composition as claimed in claim 1, wherein the sulphated ash content is less than 0.55, more preferably less than or equal to 0.50, mass % as determined by ASTM D874.

3. A lubricating oil composition as claimed in claim 1 or 2, wherein the ashless aromatic amine antioxidant is present in an amount of at least 0.8 mass %, based on the total mass of the lubricating oil composition.

4. A lubricating oil composition as claimed in any one of the preceding claims, wherein the ashless aromatic amine antioxidant is present in an amount of less than or equal to 2.0 mass %, based on the total mass of the lubricating oil composition.

5. A lubricating oil composition as claimed in any one of the preceding claims, wherein the mass to mass ratio, in the lubricating oil composition, of the mass of ashless aromatic amine antioxidant (B) to the mass of magnesium provided by the

detergent component (C) is greater than or equal to 8 to 1, preferably greater than or equal to 10 to 1.

6. A lubricating oil composition as claimed in any one of the preceding claims, wherein the overbased magnesium detergent has a TBN of at least 150, preferably at least 300, mg/g KOH as determined by ASTM D2896.

7. A lubricating oil composition as claimed in any one of the preceding claims, wherein the overbased magnesium detergent is selected from one or more magnesium sulphonates, magnesium salicylates and magnesium phenates, preferably one or more magnesium salicylates.

8. A lubricating oil composition as claimed in any one of the preceding claims, wherein greater than or equal to 50, preferably greater than or equal to 55, mass % of the total metal content of the detergent component (C) comprises magnesium derived from the overbased magnesium detergent.

9. A lubricating oil composition as claimed in any one of the preceding claims, wherein the overbased magnesium detergent provides the composition with at least 0.06, preferably at least 0.07, mass % of magnesium, based on the total mass of the composition.

10. A lubricating oil composition as claimed in any one of the preceding claims, wherein the antioxidant component (B) is an ashless antioxidant component.

11. A lubricating oil composition as claimed in any one of the preceding claims, wherein the ashless aromatic amine antioxidant comprises an aryl amine

12. A lubricating oil composition as claimed in claim 10, wherein the aryl amine comprises a diaryl amine or an aryl diamine.

13. A lubricating oil composition as claimed in any one of the preceding claims further comprising one or more co-additives in a minor amount, other than additive components (B) and (C), selected from ashless dispersants, metal detergents,

corrosion inhibitors, antioxidants, pour point depressants, antiwear agents, friction modifiers, demulsifiers, antifoam agents and viscosity modifiers.

14. A lubricating oil composition as claimed in any one of the preceding claims, wherein the detergent component (C) is a metal containing detergent component.

15. A lubricating oil composition as claimed in claim 14, wherein the metal containing detergent component consists essentially of said one or more overbased magnesium detergents as defined in any one of the preceding claims.

16. A method of lubricating a spark-ignited or compression-ignited internal combustion engine comprising operating the engine with a lubricating oil composition as claimed in any one of claims 1 to 15.

17. The use, in the lubrication of a spark-ignited or compression-ignited internal combustion engine, of an antioxidant component (B), as defined in any one of the preceding claims, comprising an oil-soluble or oil-dispersible ashless aromatic amine antioxidant, as an additive in a minor amount, in combination with a detergent component (C), as defined in any one of the preceding claims, comprising an oil-soluble or oil-dispersible overbased magnesium detergent, as an additive in a minor amount, in a lubricating oil composition comprising an oil of lubricating viscosity in a major amount, to reduce and/or inhibit the thermal oxidation of the lubricating oil composition during operation of the engine, wherein the ashless aromatic amine antioxidant is present in an amount of at least 0.75 mass %, based on the total mass of the lubricating oil composition, and the overbased magnesium detergent provides the lubricating oil composition with at least 0.05 mass % of magnesium, based on the total mass of the lubricating oil composition, and greater than 45 mass % of the metal content of the detergent component (C), based on the total mass of metal in the detergent component, comprises magnesium derived from the overbased magnesium detergent.

18. The use as claimed in claim 17, wherein the lubricating oil composition passes the Catalyst Oxidation Test (TOC-3) Procedure D55 3099 by Renault.

CLAIMS

1. A lubricating oil composition having a sulphated ash content of less than 0.6 mass % as determined by ASTM D874, the composition comprising:

(A) an oil of lubricating viscosity in a major amount comprising a Group III base stock;

(B) an antioxidant component, as an additive in a minor amount, comprising an oil-soluble or oil-dispersible ashless aromatic amine antioxidant present in an amount of at least 0.75 mass %, based on the total mass of the lubricating oil composition; and,

(C) a detergent component, as an additive in a minor amount, comprising an oil-soluble or oil-dispersible overbased magnesium detergent providing the lubricating oil composition with at least 0.05 mass % of magnesium, based on the total mass of the lubricating oil composition, wherein greater than 45 mass % of the metal content of the detergent component (C), based on the total mass of metal in the detergent component, comprises magnesium derived from the overbased magnesium detergent.

2. A lubricating oil composition as claimed in claim 1, wherein the sulphated ash content is less than 0.55, more preferably less than or equal to 0.50, mass % as determined by ASTM D874.

3. A lubricating oil composition as claimed in claim 1 or 2, wherein the ashless aromatic amine antioxidant is present in an amount of at least 0.8 mass %, based on the total mass of the lubricating oil composition.

4. A lubricating oil composition as claimed in any one of the preceding claims, wherein the ashless aromatic amine antioxidant is present in an amount of less than or equal to 2.0 mass %, based on the total mass of the lubricating oil composition.

5. A lubricating oil composition as claimed in any one of the preceding claims, wherein the mass to mass ratio, in the lubricating oil composition, of the mass of ashless aromatic amine antioxidant (B) to the mass of magnesium provided by the

detergent component (C) is greater than or equal to 8 to 1, preferably greater than or equal to 10 to 1.

6. A lubricating oil composition as claimed in any one of the preceding claims, wherein the overbased magnesium detergent has a TBN of at least 150, preferably at least 300, mg/g KOH as determined by ASTM D2896.

7. A lubricating oil composition as claimed in any one of the preceding claims, wherein the overbased magnesium detergent is selected from one or more magnesium sulphonates, magnesium salicylates and magnesium phenates, preferably one or more magnesium salicylates.

8. A lubricating oil composition as claimed in any one of the preceding claims, wherein greater than or equal to 50, preferably greater than or equal to 55, mass % of the total metal content of the detergent component (C) comprises magnesium derived from the overbased magnesium detergent.

9. A lubricating oil composition as claimed in any one of the preceding claims, wherein the overbased magnesium detergent provides the composition with at least 0.06, preferably at least 0.07, mass % of magnesium, based on the total mass of the composition.

10. A lubricating oil composition as claimed in any one of the preceding claims, wherein the antioxidant component (B) is an ashless antioxidant component.

11. A lubricating oil composition as claimed in any one of the preceding claims, wherein the ashless aromatic amine antioxidant comprises an aryl amine

12. A lubricating oil composition as claimed in claim 10, wherein the aryl amine comprises a diaryl amine or an aryl diamine.

13. A lubricating oil composition as claimed in any one of the preceding claims further comprising one or more co-additives in a minor amount, other than additive components (B) and (C), selected from ashless dispersants, metal detergents,

corrosion inhibitors, antioxidants, pour point depressants, antiwear agents, friction modifiers, demulsifiers, antifoam agents and viscosity modifiers.

14. A lubricating oil composition as claimed in any one of the preceding claims, wherein the oil-soluble or oil-dispersible overbased magnesium detergent is the sole metal containing detergent in the lubricating oil composition.

15. A method of lubricating a spark-ignited or compression-ignited internal combustion engine comprising operating the engine with a lubricating oil composition as claimed in any one of claims 1 to 14.

16. The use, in the lubrication of a spark-ignited or compression-ignited internal combustion engine, of an antioxidant component (B), as defined in any one of the preceding claims, comprising an oil-soluble or oil-dispersible ashless aromatic amine antioxidant, as an additive in a minor amount, in combination with a detergent component (C), as defined in any one of the preceding claims, comprising an oil-soluble or oil-dispersible overbased magnesium detergent, as an additive in a minor amount, in a lubricating oil composition comprising an oil of lubricating viscosity in a major amount comprising a Group III base stock, to reduce and/or inhibit the thermal oxidation of the lubricating oil composition during operation of the engine, wherein the ashless aromatic amine antioxidant is present in an amount of at least 0.75 mass %, based on the total mass of the lubricating oil composition, the overbased magnesium detergent provides the lubricating oil composition with at least 0.05 mass % of magnesium, based on the total mass of the lubricating oil composition, and greater than 45 mass % of the metal content of the detergent component (C), based on the total mass of metal in the detergent component, comprises magnesium derived from the overbased magnesium detergent.