composition derived from a basic nitrogen-containing compound, a molybdenum compound and carbon disulfide; (c) a borate ester; and (d) optionally a phosphorus-containing compound provided that the phosphorus content of the composition does not exceed about 0.10 wt.%. The '378 patent further discloses that the lubricating oil composition has a boron content of about 30 ppm to about 600 ppm and a molybdenum content of about 25 ppm to about 800 ppm.

[0005] U.S. Patent No. 7,026,273 ("the '273 patent") discloses a lubricating oil composition containing a major amount of oil of lubricating viscosity, and a minor amount of a boron-containing additive, a detergent additive composition and one or more co-additives. The '273 patent further discloses that the lubricating oil composition has a boron content of greater than 150 ppm, a molybdenum content of at most 1000 ppm and less than 4000 ppm by mass of sulfur.

[0006] EP 0 737 735 ("the 735 application") discloses a lubricant composition produced by blending (a) a Mo-containing friction conditioner; and (b) a B-containing compound with a lubricant base oil. The 735 application further discloses that the lubricating oil composition has a boron content of greater than 0.015 wt. % (150 ppm) and a molybdenum content of 100 ppm to 2000 ppm.

[0007] It is desirable to develop improved lubricating oil compositions which exhibit improved deposit reduction, as well as wear and oxidation inhibition when used in an internal combustion engine.

SUMMARY OF THE DISCLOSURE~~INVENTION~~

[0008] In accordance with one embodiment of the present disclosure~~invention~~, a lubricating oil composition having a sulfur content of up to about 0.4 wt. % and a

sulfated ash content of up to about 0.5 wt. % as determined by ASTM D874 is provided which comprises (a) a major amount of an oil of lubricating viscosity; (b) at least one oil-soluble or dispersed oil-stable boron-containing compound having no more than about 400 ppm of boron, based upon the total mass of the composition; and (c) at least one oil-soluble or dispersed oil-stable molybdenum-containing compound having at least about 1100 ppm of molybdenum, based upon the total mass of the composition; wherein the lubricating oil composition has a ratio of sulfur to molybdenum of less than or equal to about 4:1.

[0008a] In one aspect, there is provided the use of a lubricating oil composition having a sulfur content of up to 0.4 wt. % and a sulfated ash content of up to 0.5 wt. % as determined by ASTM D874 and comprising (a) a major amount of an oil of lubricating viscosity; (b) at least one oil-soluble or dispersed oil-stable boron-containing compound having no more than 400 ppm of boron, based upon the total mass of the composition; and (c) at least one oil-soluble or dispersed oil-stable molybdenum-containing compound having at least 1100 ppm of molybdenum, based upon the total mass of the composition; wherein the lubricating oil composition has a weight ratio of sulfur to molybdenum of less than or equal to 4:1, for inhibiting wear in an internal combustion engine.

[0009] In accordance with a second embodiment of the present disclosure~~invention~~, there is provided a method of operating an internal combustion engine which comprises operating the internal combustion engine with a lubricating oil composition having a sulfur content of up to about 0.4 wt. % and a sulfated ash content of up to about 0.5 wt. % as determined by ASTM D874 and comprising (a) a major amount of an oil of lubricating viscosity; (b) at least one oil-soluble or dispersed oil-stable boron-containing compound having no more than about 400 ppm of boron, based upon the total mass of the composition; and (c) at least one oil-soluble or dispersed oil-stable molybdenum-containing compound having at least about 1100 ppm of molybdenum, based upon the total mass of the composition; wherein the lubricating oil composition has a ratio of sulfur to molybdenum of less than or equal to about 4:1.

[0010] In accordance with a third embodiment of the present disclosure~~invention~~, there is provided an internal combustion engine lubricated with a lubricating oil composition having a sulfur content of up to about 0.4 wt. % and a sulfated ash content of up to about 0.5 wt. % as determined by ASTM D874 and comprising (a) a major amount of an oil of lubricating viscosity; (b) at least one oil-soluble or

dispersed oil-stable boron-containing compound having no more than about 400 ppm of boron, based upon the total mass of the composition; and (c) at least one oil-soluble or dispersed oil-stable molybdenum-containing compound having at least about 1100 ppm of molybdenum, based upon the total mass of the composition; wherein the lubricating oil composition has a ratio of sulfur to molybdenum of less than or equal to about 4:1.

[0011] The molybdenum-containing lubricating oil compositions of the present disclosure~~invention~~ advantageously provide high wear inhibition when used in an internal combustion engine while containing relatively low levels of sulfated ash content. In addition, the high wear inhibition can be achieved with the molybdenum-containing lubricating oil compositions of the present invention while also employing relatively low levels (or substantially free) of any phosphorus and zinc content.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] The present invention is directed to a lubricating oil composition having a sulfur content of up to about 0.4 wt. % and a sulfated ash content of up to about 0.5 wt. % as determined by ASTM D874 and containing at least (a) a major amount of an oil of lubricating viscosity; (b) at least one oil-soluble or dispersed oil-stable boron-containing compound having no more than about 400 ppm of boron, based upon the total mass of the composition; and (c) at least one oil-soluble or dispersed oil-stable molybdenum-containing compound having at least about 1100 ppm of molybdenum, based upon the total mass of the composition; wherein the lubricating oil composition has a ratio of sulfur to molybdenum of less than or equal to about 4:1. In one embodiment, the lubricating oil composition of the present