CLAIMS

What is claimed is:

1. A lubricating composition for a spark-ignition engine, the lubricating composition comprising:

one or more base oils of lubricating viscosity;

one or more phosphorus-containing additives providing no more than about 500 ppm of phosphorus to the lubricating composition;

a detergent system providing one or more overbased calcium-containing detergents and optionally one or more magnesium-containing detergents, and wherein the detergent system is substantially free of sodium-containing detergents;

one or more silicon-containing compounds providing about 3 to about 20 ppm silicon to the lubricating composition;

wherein the lubricating composition includes a calcium content providing no more than 0.19 weight percent of calculated calcium sulfated ash content;

a weight ratio of phosphorus content to calcium sulfated ash content of at least about 0.1;

wherein about 30 weight percent or less of total calculated SASH content is provided by the calcium sulfated ash content;

wherein the overbased calcium-containing detergent has a total base number (TBN) of at least about 250 mg KOH/g as determined by ASTM D2896; and

wherein a weight ratio of calcium sulfated ash content to silicon content is about 250 or less.

2. The lubricating composition of claim 1, wherein the weight ratio of the phosphorus content to the calcium sulfated ash content is about 0.1 to about 0.3.

3. The lubricating composition of claim 2, wherein the lubricating composition has a total calculated sulfated ash content (SASH) of about 1 weight percent or less.

4. The lubricating composition of claim 1, wherein the lubricating composition has a total calculated sulfated ash content (SASH) of about 0.8 weight percent or less.

5. The lubricating composition of claim 1, wherein the lubricating composition has a total calculated sulfated ash content (SASH) of about 0.7 weight percent or less.

6. The lubricating composition of claim 1, wherein the one or more silicon-containing compounds provide about 5 to about 15 ppm silicon.

7. The lubricating composition of claim 1, wherein the silicon-containing compound is selected from organosilane compounds, fluorosilicone compounds, polydimethylsiloxane compounds, phenyl-methyl polysiloxane compounds, linear siloxane compounds, cyclic siloxane compounds, branched siloxane compounds, silicone polymers and copolymers, organo-silicone copolymers, silicone oil, or combinations thereof.

8. The lubricating composition of claim 1, wherein the detergent system includes the calcium-containing detergent and the magnesium-containing detergent.

9. The lubricating composition of claim 1, wherein the detergent system includes calcium sulfonate and optionally magnesium sulfonate.

10. The lubricating composition of claim 9, wherein the calcium sulfonate and the optional magnesium sulfonate are each overbased and each having a total base number (TBN) of at least about 250 mg KOH/g as determined by ASTM D2896.

11. The lubricating composition of claim 1, wherein the detergent system is free of phenate-based detergents.

12. The lubricating composition of claim 1, wherein the one or more base oils of lubricating viscosity are selected from API Group I base oils, API Group II base oils, API Group III base oils, or combinations thereof.

13. The lubricating composition of claim 1, wherein the one or more base oils of lubricating viscosity are selected from API Group I base oils, API Group II base oils, or combinations thereof.

14. The lubricating composition of claim 1, wherein the lubricating composition exhibits no more than 5 average events pursuant to a Sequence IX low speed pre-ignition test of ASTM D8291 and/or exhibits no more than 8 maximum events pursuant to the Sequence IX low speed pre-ignition test of ASTM D8291.

15. The lubricating composition of claim 1, wherein the one or more phosphorus-containing additives provide about 200 to about 400 ppm phosphorus.

16. A method of lubricating a spark-ignition engine, the method comprising:

lubricating the crankcase of a spark-ignition engine with a lubricating composition;

wherein the lubricating composition includes (i) one or more base oils of lubricating viscosity; (ii) one or more phosphorus-containing additives providing no more than about 500 ppm of phosphorus to the lubricating composition; (iii) a detergent system providing one or more overbased calcium-containing detergents and optionally one or more magnesium-containing detergents, and wherein the detergent system is substantially free of sodium-containing detergents; (iv) one or more silicon-containing compounds providing about 3 to about 20 ppm silicon to the lubricating composition; (v) wherein the lubricating composition includes a calcium content providing no more than 0.19 weight percent calculated calcium sulfated ash content; and (vi) a weight ratio of phosphorus content to calcium sulfated ash content of at least about 0.1; and wherein about 30 weight percent or less of total calculated SASH content is provided by the calcium sulfated ash content; wherein the overbased calcium-containing detergent has a total base number (TBN) of at least about 250 mg KOH/g as determined by ASTM D2896; and wherein a weight ratio of calcium sulfated ash content to silicon content is about 250 or less; and

wherein the lubricating composition exhibits no more than 5 average events pursuant to a Sequence IX low speed pre-ignition test of ASTM D8291 and/or exhibits no more than 8 maximum events pursuant to the Sequence IX low speed pre-ignition test of ASTM D8291.

17. The method of claim 16, wherein the weight ratio of the phosphorus content to the calcium sulfated ash content is about 0.1 to about 0.3.

18. The method of claim 16, wherein the lubricating composition further includes one or more silicon-containing compounds providing about 3 to about 20 ppm silicon to the lubricating composition.