

What is claimed is:

1. An internal combustion engine lubricating composition comprising:
 - oil of lubricating viscosity comprising at least 50 weight percent of a Group III base oil, a Group IV base oil, or combinations thereof;
 - a boron-containing polyisobutenyl succinimide dispersant;
 - a boron-free polyisobutenyl succinimide dispersant;
 - an overbased magnesium-based detergent in an amount to deliver at least 400 ppm magnesium to the lubricating composition;
 - an overbased calcium-based detergent in an amount to deliver at least 400 ppm calcium to the lubricating composition; and
 - an ashless friction modifier.
2. The lubricating composition according to claim 1, wherein the boron-containing succinimide dispersant is derived from a polyisobutylene having a vinylidene content of greater than 70 mol %.
3. The lubricating composition according to claim 1 or claim 2, wherein the boron-containing succinimide has a number average molecular weight of from 1750 to 2200.
4. The lubricating composition according to any one of the preceding claims, wherein the boron-containing succinimide dispersant is present in the lubricating composition in an amount of from 0.2 to 2.1 wt %.
5. The lubricating composition according to any one of the preceding claims, wherein the boron-containing succinimide dispersant is present in the lubricating composition in an amount of from 0.5 to 1.8 wt %.
6. The lubricating composition according to any one of the preceding claims, wherein the boron-containing succinimide dispersant is present in the lubricating composition in an amount of from 1 to 2.1 wt %.

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7. The lubricating composition according to any one of the preceding claims, wherein the boron-containing succinimide dispersant is present in the lubricating composition in an amount of from 1.5 to 1.7 wt %.
8. The lubricating composition according to any one of the preceding claims, wherein the boron-free polyisobutenyl succinimide dispersant has a number average molecular weight of from 750 to 2500.
9. The lubricating composition according to any one of the preceding claims, wherein the boron-free polyisobutenyl succinimide dispersant is present in the lubricating composition in an amount 0.5 to 6.5 wt %.
10. The lubricating composition according to any one of the preceding claims, wherein the boron-free polyisobutenyl succinimide dispersant is present in the lubricating composition in an amount 0.7 to 6.5 wt %.
11. The lubricating composition according to any one of the preceding claims, wherein the boron-free polyisobutenyl succinimide dispersant is present in the lubricating composition in an amount 1.5 to 4.1 wt %.
12. The lubricating composition according to any one of the preceding claims, wherein the boron-free polyisobutenyl succinimide dispersant is present in the lubricating composition in an amount 2.0 to 3.1 wt %.
13. The lubricating composition according to any one of the preceding claims, wherein the boron-free polyisobutenyl succinimide dispersant is present in the lubricating composition in an amount 2.5 to 2.8 wt %.
14. The lubricating composition according to any one of the preceding claims, wherein the boron-free polyisobutenyl succinimide dispersant includes a first boron-free polyisobutenyl succinimide dispersant having a number average molecular weight of from

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750 to 1750 and a second boron-free polyisobutenyl succinimide dispersant having a number average molecular weight of from 1950 to 2500.

15. The lubricating composition according to claim 14, wherein the first boron-free polyisobutenyl succinimide dispersant is present in the lubricating composition in an amount of from 0.5 to 4.5 and the second boron-free polyisobutenyl succinimide dispersant is present in the lubricating composition in an amount of from 0.2 to 2.0.

16. The lubricating composition according to claim 13, wherein the first boron-free polyisobutenyl succinimide dispersant is present in the lubricating composition in an amount of from 1.8 to 2.5 and the second boron-free polyisobutenyl succinimide dispersant is present in the lubricating composition in an amount of from 0.5 to 0.8.

17. The lubricating composition according to any one of the preceding claims, wherein the overbased magnesium-based detergent is present in the lubricating composition in an amount of from 0.1 to 1.5 wt %.

18. The lubricating composition according to any one of the preceding claims, wherein the overbased magnesium-based detergent is present in the lubricating composition in an amount of from 0.2 to 0.8 wt %.

19. The lubricating composition according to any one of the preceding claims, wherein the overbased magnesium-based detergent is present in the lubricating composition in an amount of from 0.2 to 0.4 wt %.

20. The lubricating composition according to any one of the preceding claims, wherein the overbased magnesium-based detergent is an overbased alkylbenzene sulfonate detergent having a metal ratio of at least 8.

21. The lubricating composition according to any one of the preceding claims, wherein the overbased magnesium-based detergent has a TBN (KOH/g) greater than 500.

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22. The lubricating composition according to any one of the preceding claims, wherein the overbased magnesium-based detergent has a TBN (KOH/g) of from 500 to 850.

23. The lubricating composition according to any one of the preceding claims, wherein the overbased magnesium-based detergent has a TBN (KOH/g) of from 600 to 750.

24. The lubricating composition according to any one of the preceding claims, wherein the overbased magnesium-based detergent delivers from 400 to 1200 ppm magnesium to the lubricating composition.

25. The lubricating composition according to any one of the preceding claims, wherein the overbased magnesium-based detergent delivers from 400 to 700 ppm magnesium to the lubricating composition.

26. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent is present in the lubricating composition in an amount of from 0.1 to 2.5 wt %.

27. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent is present in the lubricating composition in an amount of from 0.3 to 1.5 wt %.

28. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent is present in the lubricating composition in an amount of from 0.4 to .8 wt %.

29. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent is present in the lubricating composition in an amount of from 0.4 to 0.6 wt %.

30. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent has a metal ratio of at least 5.

31. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent has a TBN (KOH/g) from 450 to 850.

32. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent has a TBN (KOH/g) from 500 to 750.

33. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent delivers from 400 to 1200 ppm calcium to the lubricating composition.

34. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent delivers from 400 to 700 ppm calcium to the lubricating composition.

35. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent is selected from an overbased calcium salixarate detergent, an overbased calcium salicylate detergent, or mixtures thereof.

36. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent is an overbased calcium salicylate detergent.

37. The lubricating composition according to any one of the preceding claims, wherein the overbased calcium-based detergent includes a mixture of an overbased calcium salixarate detergent and an overbased calcium salicylate detergent.

38. The lubricating composition according to any one of the preceding claims, further comprising an ashless antioxidant present in an amount of at least 0.9 weight percent of the lubricating composition.

39. The lubricating composition according to claim 34, wherein the ashless antioxidant is present in an amount of from 0.9 to 2.5 wt %.

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40. The lubricating composition according to claim 34, wherein the ashless antioxidant is present in an amount of from 1.1 to 2.0 wt %.

41. The lubricating composition according to any one of the preceding claims, wherein the ashless friction modifier includes one or more of an ester, an amide, or an imide of an alpha-hydroxy carbonyl compound, and mixtures thereof.

42. The lubricating composition according to any one of the preceding claims, wherein the ashless friction modifier is present in the lubricating composition in an amount of from 0.01 to 1.1 wt %.

43. The lubricating composition of any one of the preceding claims, wherein the ashless friction modifier is present in the lubricating composition in an amount of from 0.1 to .5 wt %.

44. The lubricating composition according to any one of the preceding claims, wherein the ashless friction modifier is present in the lubricating composition in an amount of from 0.2 to 0.4 wt %.

45. The lubricating composition according to any one of the preceding claims, further comprising a zinc dialkyldithiophosphate anti-wear agent in an amount to deliver 200 ppm up to 1000 ppm phosphorus to the lubricating composition.

46. The lubricating composition according to claim 41, wherein the zinc dialkyldithiophosphate anti-wear agent delivers from 450 ppm up to 800 ppm phosphorus to the lubricating composition.

47. The lubricating composition according to claim 41, wherein the zinc dialkyldithiophosphate anti-wear agent delivers from 600 ppm up to 800 ppm phosphorus to the lubricating composition.

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48. The lubricating composition according to any one of the preceding claims, wherein the lubricating composition is free of or substantially free of tetrapropenylphenol (pddp) and derivatives thereof.

49. The lubricating composition according to any one of the preceding claims, wherein the internal combustion engine is a gasoline-fueled internal combustion engine.

50. A method of improving cleanliness in a gasoline-fueled internal combustion engine comprising supplying to an internal combustion engine a lubricating composition according to any one of the preceding claims.

51. A method of improving the fuel economy of a gasoline-fueled internal combustion engine comprising supplying to the engine a lubricating composition according to any one of claims 1 to 48.

52. A method for reducing low speed preignition in a gasoline-fueled internal combustion engine operating at a brake mean effective pressure (BMEP) of greater than 12 bars and at a speed of less than 3,000 RPMs comprising: supplying to said engine a lubricating composition according to any one of claims 1 to 48.

53. The method of claim 52 where the gasoline-fueled internal combustion engine further comprises a turbo charger.

54. A method of improving TBN retention of a lubricating composition in a gasoline fueled internal combustion engine comprising supplying to the gasoline fueled internal combustion engine a lubricating composition according to any one of claim 1 to 48.

55. Use of the lubricating composition of any one of claims 1 to 49 for improving one or more of cleanliness, TBN retention, and fuel economy in a gasoline-fueled internal combustion engine.