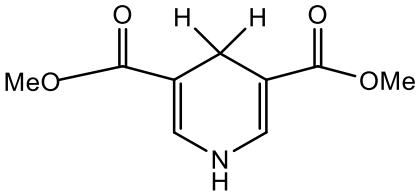
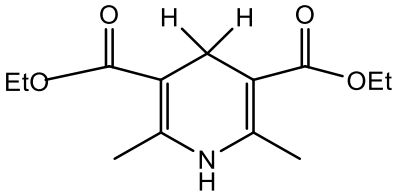
CLAIMS

1. A fuel composition comprising (1) greater than 50 wt. % of a hydrocarbon fuel boiling in gasoline or diesel range and (2) a minor amount of one or more of organic hydride-based reductant, wherein the one or more organic hydride-based reductant is:

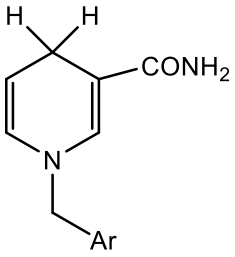
(a) a reductant as illustrated by Formulas 1A – 1K



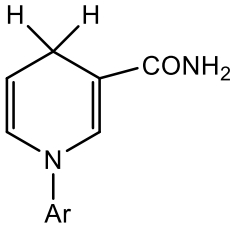
Formula 1A



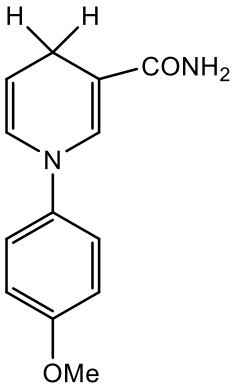
Formula 1B



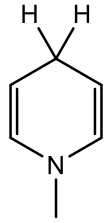
Formula 1C



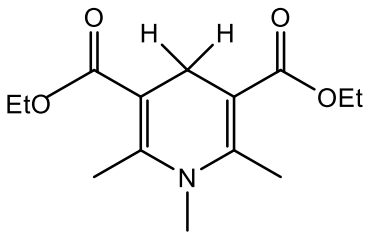
Formula 1D



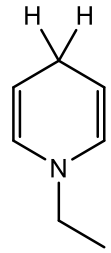
Formula 1E



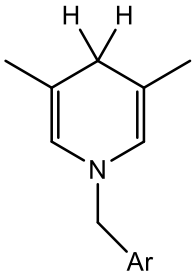
Formula 1F



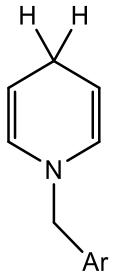
Formula 1G



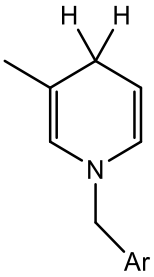
Formula 1H



Formula 1I



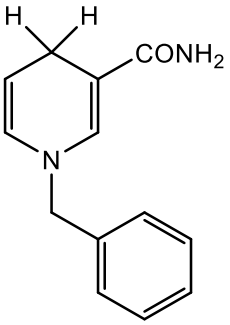
Formula 1J



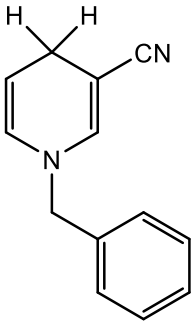
Formula 1K

wherein Ar is an aryl moiety;

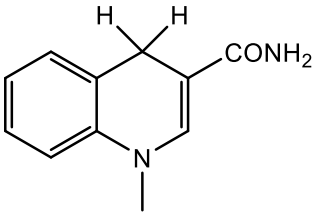
(b) a reductant as illustrated by Formulas 2A – 2F



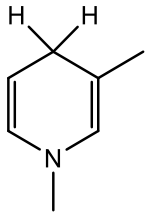
Formula 2A



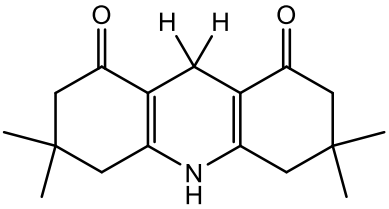
Formula 2B



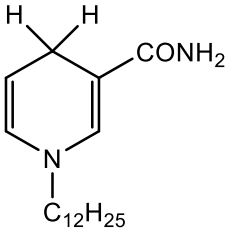
Formula 2C



Formula 2D

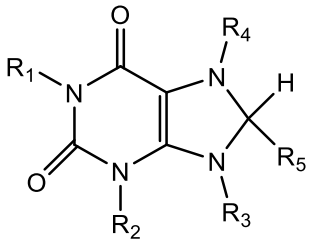


Formula 2E



Formula 2F;

(c) a reductant as illustrated by generalized structure Formula 3



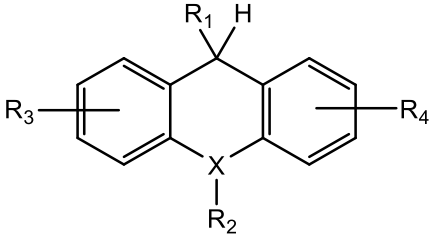
Formula 3

wherein:

R_1, R_2, R_3, and R_4 are each independently selected from the following group: H, alkyl moiety, allyl moiety, and alkanol moiety; and

R_5 is selected from the following group: H, and alkyl moiety;

(d) a reductant as illustrated by generalized structure Formula 4



Formula 4

wherein X is N or O; and

when X is N:

R_1 is selected from the following group: H, alkyl moiety, allyl moiety, aryl moiety, and benzyl moiety;

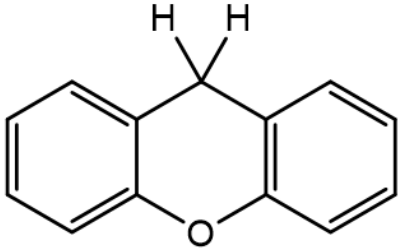
R_2 is selected from the following group: H, alkyl moiety, allyl moiety, aryl moiety, benzyl moiety, and alkanol moiety;

R_3 and R_4 are each independently selected from the following group: H, alkyl moiety, aryl moiety, benzyl moiety, amine moiety, alkoxy moiety, and heteroatoms;

optionally wherein R_3 as well as R_4 independently occupy more than one substitution position within its respective rings; and

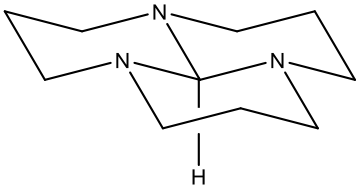
optionally wherein R_1 and R_3 or R_1 and R_4 form a cyclic structure;

when X is O, the reductant is as illustrated by structure Formula 4H

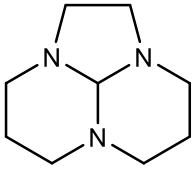


Formula 4H;

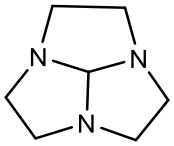
(e) a reductant as illustrated by Formulas 6A – 6C



Formula 6A

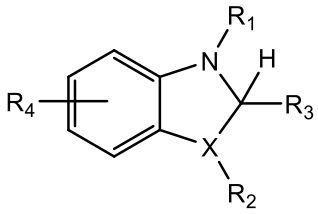


Formula 6B



Formula 6C;

(f) a reductant as illustrated by generalized structure Formula 7



Formula 7

wherein:

X is N, O, or S;

when X is N:

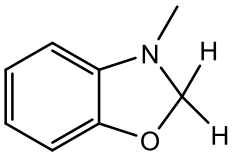
R_1 and R_2 are each independently selected from the following group: H, and alkyl moiety;

R_3 is selected from the following group: H, alkyl moiety, alkene moiety, alkyne moiety, aryl moiety, and benzyl moiety; and

R_4 is selected from the following group: H, alkyl moiety, aryl moiety, benzyl moiety, and allyl moiety;

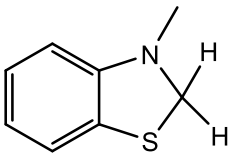
optionally wherein R_4 independently occupies more than one substitution position;

when X is O, the reductant is as illustrated by structure Formula 7I



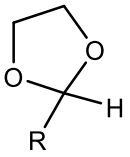
Formula 7I;

when X is S, the reductant is as illustrated by structure Formula 7J



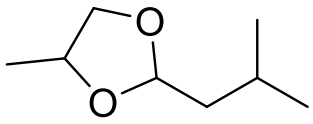
Formula 7J;

(g) a reductant as illustrated by generalized structure Formula 8

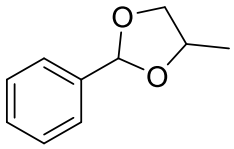


Formula 8

wherein R is selected from the following group: H, alkyl moiety, allyl moiety, benzyl moiety, and alkanol moiety; or reductant as illustrated by structure Formulas 8D and 8E:



Formula 8D



Formula 8E.

2. The fuel composition of claim 1, wherein the organic hydride-based reductant is present in 25 to 5000 ppm by weight.

3. The fuel composition of claim 1, wherein the organic hydride-based reductant is present in 250 to 2000 ppm by weight.

4. The fuel composition of claim 1, further comprising:

oxygenate, anti-knock agent, detergent, dispersant, friction modifier, antioxidant, metal deactivator, demulsifier, pour point depressant, flow improver, cetane improver, or lubricity additive.

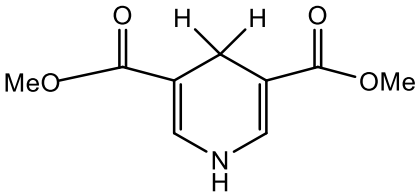
5. Use of the fuel composition according to any one of claims 1-3 for preventing or reducing undesirable ignition events in an internal combustion engine, wherein the internal combustion engine is spark-ignited, operated at less than 3000 rpm, and operated under a load with a brake mean effective pressure of at least 1 MPa (10 bar).

6. Use of one or more organic hydride-based reductants as defined in claim 1 in a fuel composition to prevent or reduce low-speed pre-ignition events in an internal combustion engine, wherein the fuel composition is supplied to the engine and comprises greater than 50 wt. % of a hydrocarbon fuel boiling in gasoline range and a

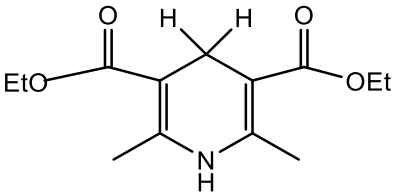
minor amount of the one or more of organic hydride-based reductants, and wherein the engine is spark-ignited, operated at less than 3000 rpm and operated under a load with a brake mean effective pressure of at least 1 MPa (10 bar).

7. A lubricating oil composition comprising (1) greater than 50 wt. % of a base oil and (2) a minor amount of one or more of an organic hydride-based reductant, wherein the one or more organic hydride-based reductant is:

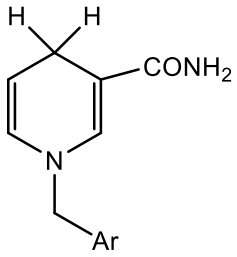
(a) a reductant as illustrated by Formulas 1A-1K



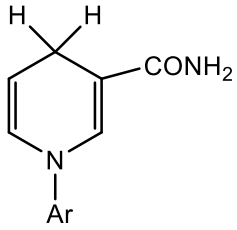
Formula 1A



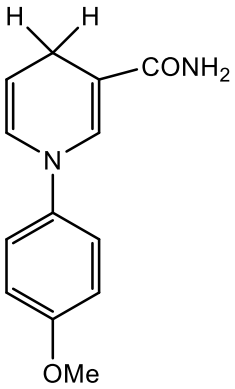
Formula 1B



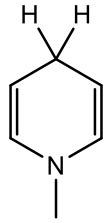
Formula 1C



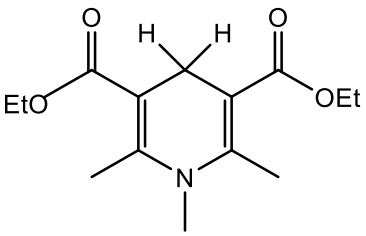
Formula 1D



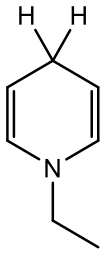
Formula 1E



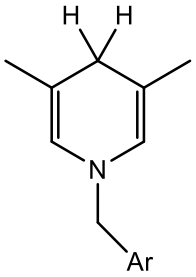
Formula 1F



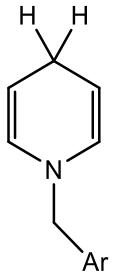
Formula 1G



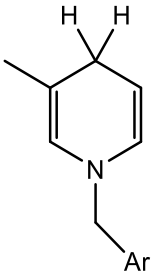
Formula 1H



Formula 1I



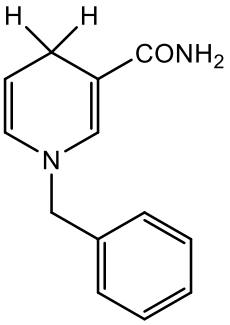
Formula 1J



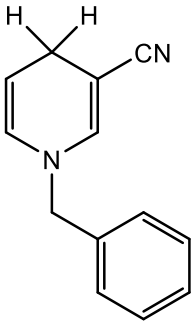
Formula 1K

wherein Ar is an aryl moiety;

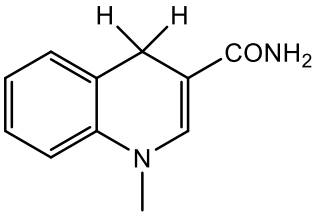
(b) a reductant as illustrated by Formulas 2A – 2F



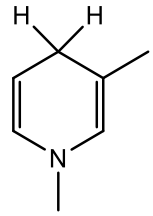
Formula 2A



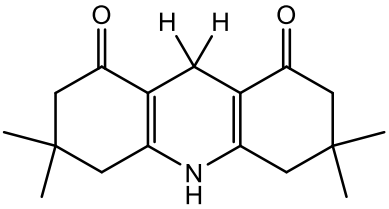
Formula 2B



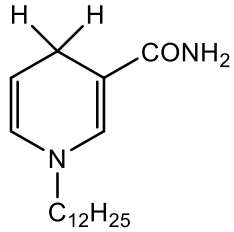
Formula 2C



Formula 2D

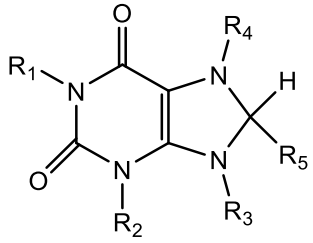


Formula 2E



Formula 2F;

(c) a reductant as illustrated by generalized structure Formula 3



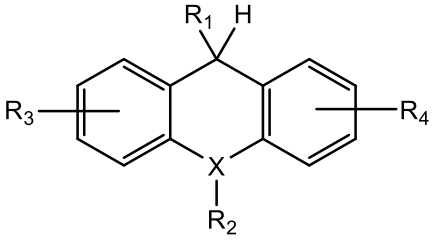
Formula 3

wherein:

R_1, R_2, R_3, and R_4 are each independently selected from the following group: H, alkyl moiety, allyl moiety, and alkanol moiety; and

R_5 is selected from the following group: H, and alkyl moiety;

(d) a reductant as illustrated by generalized structure Formula 4



Formula 4

wherein X is N or O; and

when X is N:

R_1 is selected from the following group: H, alkyl moiety, allyl moiety, aryl moiety, and benzyl moiety;

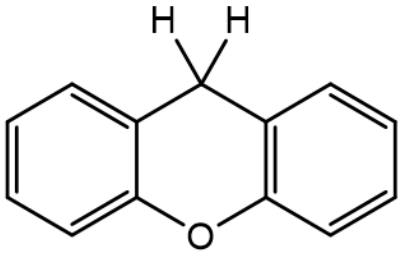
R_2 is selected from the following group: H, alkyl moiety, allyl moiety, aryl moiety, benzyl moiety, and alkanol moiety;

R_3 and R_4 are each independently selected from the following group: H, alkyl moiety, aryl moiety, benzyl moiety, amine moiety, alkoxy moiety, and heteroatoms;

optionally wherein R_3 as well as R_4 independently occupy more than one substitution position within its respective rings; and

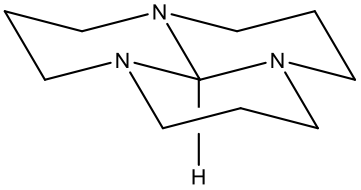
optionally wherein R_1 and R_3 or R_1 and R_4 form a cyclic structure;

when X is O, the reductant is as illustrated by structure Formula 4H

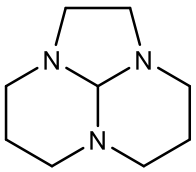


Formula 4H;

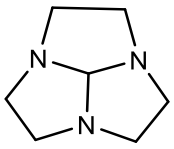
(e) a reductant as illustrated by Formulas 6A – 6C



Formula 6A



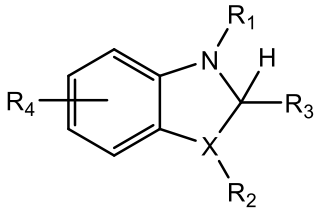
Formula 6B



Formula 6C

wherein R_1, R_2, R_3, R_4, R_5, and R_6 are connected to form three cyclic rings;

(f) a reductant as illustrated by generalized structure Formula 7



Formula 7

wherein:

X is N, O, or S;

when X is N:

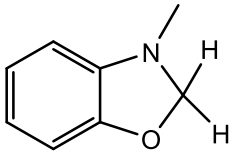
R_1 and R_2 are each independently selected from the following group: H, and alkyl moiety;

R_3 is selected from the following group: H, alkyl moiety, alkene moiety, alkyne moiety, aryl moiety, and benzyl moiety; and

R_4 is selected from the following group: H, alkyl moiety, aryl moiety, benzyl moiety, and allyl moiety;

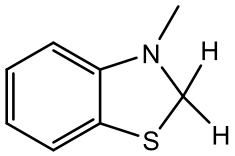
optionally wherein R_4 independently occupies more than one substitution position;

when X is O, the reductant is as illustrated by structure Formula 7I



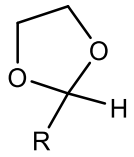
Formula 7I;

when X is S, the reductant is as illustrated by structure Formula 7J



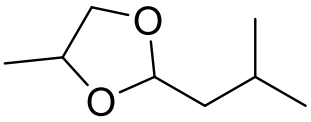
Formula 7J;

(g) a reductant as illustrated by generalized structure Formula 8

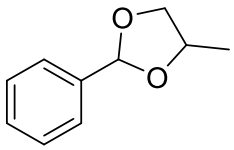


Formula 8

wherein R is selected from the following group: H, alkyl moiety, allyl moiety, benzyl moiety, and alkanol moiety; or reductant as illustrated by structure Formulas 8D and 8E:



Formula 8D



Formula 8E.

8. The lubricating oil composition of claim 7, wherein the organic hydride-based reductant is present in 0.001 to 10% by weight.

9. The lubricating oil composition of claim 7, wherein the organic hydride-based reductant is present in 0.5 to 5% by weight.

10. The lubricating oil composition of claim 7, further comprising:

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

11. Use of the lubricating oil composition according to any one of claims 7-10 for preventing or reducing undesirable ignition events in an internal combustion engine, wherein the internal combustion engine is spark-ignited, operated at less than 3000

rpm, and operated under a load with a brake mean effective pressure of at least 1 MPa (10 bar).

12. Use of one or more organic hydride-based reductants as defined in claim 7 in a lubricating oil composition to prevent or reduce low-speed pre-ignition events in an internal combustion engine, wherein the lubricating oil composition is supplied to the engine and comprises greater than 50 wt. % of a base oil and a minor amount of one or more of organic hydride-based reductant, and wherein the engine is spark-ignited, operated at less than 3000 rpm and operated under a load with a brake mean effective pressure of at least 1 MPa (10 bar).