CLAIMS

1. A fuel composition comprising:

a hydrocarbon-based fuel boiling in the gasoline or diesel range;

an amine-based detergent given by formula

$$R_1\text{-}O\text{-}(CH_2)_m\text{-}NHR_2,$$

wherein the amine-based detergent is present in 10 ppm to 750 ppm by weight based on total weight of the fuel composition; wherein R_1 is a hydrocarbyl group having 8 to 20 carbons, R_2 is hydrogen or $(CH_2)_nNH_2$ moiety, and wherein m, n are independently integers having a value of 3 or greater; and

one or more nitrogen-containing detergent,

wherein the one or more nitrogen-containing detergent is an aliphatic hydrocarbyl amine, hydrocarbyl-substituted poly(oxyalkylene)amine, hydrocarbyl-substituted succinimide, Mannich reaction product, nitro and amino aromatic ester of polyalkylphenoxyalkanol, or polyalkylphenoxyaminoalkane; and

wherein the fuel composition further comprises antioxidants, metal deactivators, demulsifiers, oxygenates, antiknock agents, dispersants, pour point depressants, or flow improvers.

2. The fuel composition of claim 1, wherein R_1 is linear or branched.

3. The fuel composition of claim 1, wherein the amine-based detergent or the one or more nitrogen-containing detergent is a monoamine or a polyamine.

4. The fuel composition of claim 1, wherein the one or more nitrogen-containing detergent is present in 50 ppm to 2500 ppm of the fuel composition.

5. A concentrate composition comprising:

30 to 90 wt % of an organic solvent boiling in a range of from 65°C to 205°C and;

10 to 70 wt % of a detergent mixture comprising:

(1) an amine-based detergent given by formula

R_1-O-$(CH_2)_m$-NHR_2,

wherein R_1 is a hydrocarbyl group having 8 to 20 carbons, R_2 is hydrogen or $(CH_2)_nNH_2$ moiety, and wherein m, n are independently integers having a value of 3 or greater; and

(2) one or more nitrogen-containing detergent,

wherein the one or more nitrogen-containing detergent is an aliphatic hydrocarbyl amine, hydrocarbyl-substituted poly(oxyalkylene)amine, hydrocarbyl-substituted succinimide, Mannich reaction product, nitro and amino aromatic ester of polyalkylphenoxyalkanol, or polyalkylphenoxyaminoalkane.

6. The concentrate composition of claim 5, wherein R_1 is linear or branched

7. The concentrate composition of claim 5, wherein the amine-based detergent or the one or more nitrogen-containing detergent is a monoamine or a polyamine.

8. A method of controlling injector fouling, the method comprising:

supplying to a direct injection engine a fuel composition comprising:

a hydrocarbon-based fuel boiling in the gasoline or diesel range;

an amine-based detergent given by formula

R_1-O-$(CH_2)_m$-NHR_2,

wherein the amine-based detergent is present in 10 ppm to 750 ppm by weight based on total weight of the fuel composition; wherein R_1 is a hydrocarbyl group having 8 to 20 carbons, R_2 is hydrogen or $(CH_2)_nNH_2$ moiety, and wherein m, n are independently integers having a value of 3 or greater;

one or more nitrogen-containing detergent; and

wherein the fuel composition further comprises antioxidants, metal deactivators, demulsifiers, oxygenates, antiknock agents, dispersants, pour point depressants, or flow improvers.

9. The method of claim 8, wherein R_1 is linear or branched.

10. The method of claim 8, wherein the one or more nitrogen-containing detergent is an aliphatic hydrocarbyl amine, hydrocarbyl-substituted poly(oxyalkylene)amine, hydrocarbyl-substituted succinimide, Mannich reaction product, nitro and amino aromatic ester of polyalkylphenoxyalkanol, or polyalkylphenoxyaminoalkane.

11. The method of claim 8, wherein the amine-based detergent or the one or more nitrogen-containing detergent is a monoamine or a polyamine.

12. The method of claim 8, wherein the one or more nitrogen-containing detergent is present in 50 ppm to 2500 ppm of the fuel composition.