What we claim:

1. A method of providing improved detergency in the fuel system of an direct injection diesel engine wherein the method comprises the steps of:

I. adding to the fuel composition a nitrogen-free additive comprising a substituted hydrocarbon with at least two carboxy functionalities in the form of acids or at least one carboxy functionality in the form an anhydride; and

II. supplying said fuel composition to an internal combustion engine.

2. The method of claim 1 wherein the method provides a combination of improved detergency and improved corrosion inhibition.

3. The method of any preceding claim wherein the nitrogen free additive is selected from the group consisting of:

(a) hydrocarbyl substituted succinic anhydrides;

(b) hydrolyzed hydrocarbyl substituted succinic anhydrides;

(c) combinations thereof.

4. The method of any preceding claimwherein the substituted hydrocarbon is a hydrocarbyl substituted acylating agent with di-acid functionality.

5. The method of claim 4 wherein the hydrocarbyl group of the substituted acylating agent comprises a polyisobutylene group.

6. The method of claim 4 wherein the hydrocarbyl group of the substituted acylating agent is derived from a hydrocarbon which has a number average molecular weight from 500 to 2000.

7. The method of any preceding claim wherein the fuel composition further comprises less than 1,000 ppm of any basic nitrogen and/or amine nitrogen containing fuel detergent additives.

8. The method of any preceding claimwherein the fuel composition further comprises: an additional fuel detergent, a cetane improver, a petroleum dye and/or marker, an antioxidant, a lubricity improver, a corrosion inhibitor, a cold flow improver, a metal deactivator, a demulsifier, an antifoam agent, a drag reducing agent, or combinations thereof.

9. The method of any preceding claimwherein the fuel composition is free of nitrogen-containing dispersants and/or detergents.

10. The method of any preceding claimwherein the fuel composition contains no other fuel dispersants and/or detergents other than said substituted hydrocarbon.

11. The method of any preceding claimwherein the fuel composition comprises diesel fuel, biodiesel or combinations thereof.

12. The method of any preceding claim wherein the engine is a high pressure direct injection diesel engine and the method results in the reduction of injector deposits.

13. The method of any preceding claim wherein the engine operates with a fuel injector pressure of greater than 35 MPa.

14. A direct injection diesel engine fuel composition comprising:

(a) a fuel;

(b) a nitrogen-free additive comprising a hydrocarbon substituted with at least two carboxy functionalities in the form of acids or at least one carboxy functionality in the form an anhydride; and

(c) one or more optional additional performance additives.

15. The use of a nitrogen-free fuel additive comprising a hydrocarbon substituted with at least two carboxy functionalities in the form of acids or at least one carboxy functionality in the form an anhydride in a fuel composition to provide detergency to the fuel system of a direct injection diesel engine to which the fuel is supplied.

What we claim:

1. A method of providing improved detergency in the fuel system of a direct injection diesel engine wherein the method comprises the steps of:

I. adding to the fuel composition a nitrogen-free additive comprising a polyolefin acid derived from polyisobutylene and a dicarboxylic acid; and

II. supplying said fuel composition to an internal combustion engine, wherein the engine operates with a fuel injector pressure of equal to or greater than 160 MPa.

2. The method of claim 1 wherein the method provides a combination of improved detergency and improved corrosion inhibition.

3. The method of claim 1 or claim 2, wherein the polyisobutylene has a molecular weight of 800 to 1200.

4. The method of any one of the preceding claims, wherein the fuel composition further comprises at least one of an additional fuel detergent and/or dispersant, a cetane improver, a petroleum dye and/or marker, an antioxidant, a lubricity improver, a corrosion inhibitor, a cold flow improver, a metal deactivator, a demulsifier, an antifoam agent, a drag reducing agent, or combinations thereof.

5. The method of claim 4, wherein said additional detergent is not a nitrogen-containing dispersant and/or detergent.

6. The method of any one of claims 1 to 3, wherein the fuel composition further comprises at least one of a cetane improver, a petroleum dye and/or marker, an antioxidant, a lubricity improver, a corrosion inhibitor, a cold flow improver, a metal deactivator, a demulsifier, an antifoam agent, a drag reducing agent, or combinations thereof and does not contain other fuel dispersants and/or detergents other than said substituted hydrocarbon.

7. The method of any one of the preceding claims, wherein the fuel composition comprises diesel fuel, biodiesel or combinations thereof.

8. The method of any one of the preceding claims, wherein the engine is a high pressure direct injection diesel engine and the method results in the reduction of injector deposits.

9. The method of any one of the preceding claims, wherein said fuel composition comprises less than 1,000 ppm of basic nitrogen and/or amine nitrogen containing additional fuel detergent and/or dispersant.