performance. It is an aim of the present invention to provide “keep clean” and/or “clean up” performance.

SUMMARY

In one aspect, there is provided a fuel composition comprising as an additive the reaction product of a polycarboxylic acid having no more than 5 carbon atoms per carboxylic acid group, or an anhydride thereof and an alcohol having at least 5 carbon atoms.

In another aspect, the present disclosure provides a method of improving the performance of an engine, the method comprising combusting in the engine a fuel composition comprising as an additive the reaction product of a polycarboxylic acid having no more than 5 carbon atoms per carboxylic acid group, or an anhydride thereof and an alcohol having at least 5 carbon atoms.

In yet another aspect, there is provided the use of the reaction product of a polycarboxylic acid having no more than 5 carbon atoms per carboxylic acid group, or an anhydride thereof and an alcohol having at least 5 carbon atoms as an additive for a fuel composition to improve the performance of an engine combusting said fuel composition.

DETAILED DESCRIPTION

Many different types of compounds are known in the art for use as detergent additives in fuel oil compositions, for the control of deposits in engines. Examples of common detergents include hydrocarbyl-substituted amines; hydrocarbyl substituted succinimides; Mannich reaction products and quaternary ammonium salts. All of these known detergents are nitrogen-containing compounds.

The present invention relates in particular to detergent compounds for diesel or gasoline fuel that do not contain nitrogen. Such compounds are much less commonly used as detergents.

The use of succinic acid compounds as fuel additives is however generally known. For example polyisobutenyl substituted succinic acid compounds (PIBSAs) have long been known as additives for improving the lubricity or corrosion resistance of fuels. Existing fuel additives based on carboxylic acid compounds typically include a long hydrocarbyl chain on the acid portion of the molecule to provide fuel solubility.

The present inventors have surprisingly found a class of additives based on polycarboxylic acids which do not include such a hydrocarbyl chain.

According to a first aspect of the present invention there is provided a fuel composition comprising as an additive the reaction product of a polycarboxylic acid having no more than 5 carbon atoms per carboxylic acid group, or an anhydride thereof and an alcohol having at least 5 carbon atoms.

According to a second aspect of the present invention there is provided a method of improving the performance of an engine, the method comprising combusting in the engine a fuel composition comprising as an additive the reaction product of a polycarboxylic acid having no more than 5 carbon atoms per carboxylic acid group, or an anhydride thereof and an alcohol having at least 5 carbon atoms.

According to a third aspect of the present invention there is provided the use of the reaction product of polycarboxylic acid having no more than 5 carbon atoms per carboxylic acid group, or an anhydride thereof and an alcohol having at least 5 carbon atoms as an additive for a fuel composition to improve the performance of an engine combusting said fuel composition.

The method of the second aspect preferably involves combusting in the engine a composition of the first aspect.