Emulsifier package with quaternary ammonium surfactant for fuel emulsion

Description

The present invention relates to a fuel emulsion for powering a diesel engine comprising water, a fuel, and an emulsifier package, which comprises a quaternary ammonium surfactant. It further relates to a method for powering a diesel engine with the fuel emulsion comprising the step of preparing the fuel emulsion by emulsifying a fuel and water in the presence of the emulsifier package; and to an emulsifier package for emulsifying a fuel and water comprising a quaternary ammonium surfactant which is obtainable by reacting a quaternizable nitrogen compound comprising at least one quaternizable, especially tertiary, amino group with a quaternizing agent which converts the at least one quaternizable, especially tertiary, amino group to a quaternary ammonium group, where the quaternizing agent is a hydrocarbyl epoxide in combination with a free hydrocarbyl-substituted polycarboxylic acid, and at least one nonionic surfactant which is an alkoxylate.

Aqueous fuel emulsions are known for powering diesel engines.

Object of the present disclosure was to find an emulsifier package for fuel emulsions, which is cheap, easy to prepare, storage stable, based on commercial available emulsifiers, based only on carbon, hydrogen, nitrogen and oxygen, and allow for fast and easy emulsification even with low shear forces. The emulsifier package should result in a low foaming fuel emulsion, it should have a low cloud point, provide corrosion protection, have low foaming, improve filterability of the emulsion, and reduce precipitate when mixing the fuel with water. The emulsifier package should stabilize the fuel emulsion at high water concentrations, at various temperatures and pressures, with various types of water.

In one aspect, the present disclosure refers to a fuel emulsion for powering a diesel engine comprising

- water,
- a fuel, and
- an emulsifier package, which comprises a quaternary ammonium surfactant.

In another aspect, the present disclosure refers to a method for powering a diesel engine with a fuel emulsion comprising the step of preparing the fuel emulsion by emulsifying a fuel and water in the presence of the emulsifier package as defined above.

In yet another aspect, the present disclosure refers to an emulsifier package for emulsifying a fuel and water comprising

- a quaternary ammonium surfactant which is obtainable by reacting a quaternizable nitrogen compound comprising at least one quaternizable, especially tertiary, amino group with a quaternizing agent which converts the at least one quaternizable, especially tertiary, amino