In some embodiments, the sulfated ash content of the lubricating oil composition disclosed herein is at most about 2.0, 1.5, 1.0, 0.8, 0.6, or 0.4 wt.%, based on the total weight of the lubricating oil composition.

In certain embodiments, the biodiesel fuel of the lubricating oil composition disclosed herein comprises an alkyl ester of a long chain fatty acid. In further embodiments, the long chain fatty acid comprises from about 12 carbon atoms to about 30 carbon atoms.

In certain embodiments, the amount of the biodiesel fuel is from at least 0.3 wt.%, or from about 0.3 to 20 wt.%, 1 wt.% to about 20 wt.%, 1 wt.% to about 15 wt.%, 1 wt.% to about 10 wt.%, 1 wt.% to about 9 wt.%, 1 wt.% to about 8 wt.%, 1 wt.% to about 7 wt.%, 4 wt.% to about 8 wt.%, or from 1 wt.%, 2 wt.%, 3 wt.%, 4 wt.%, 5 wt.%, 6 wt.%, 7 wt.%, 8 wt.%, or 9 wt.%, based on the total weight of the lubricating oil composition.

In some embodiments, the amount of the base oil of the lubricating oil composition disclosed herein is at least 40 wt.%, based on the total weight of the lubricating oil composition. In further embodiments, the base oil has a kinematic viscosity from about 4 cSt to about 20 cSt at 100 °C.

In another aspect, there is provided a method of lubricating a diesel engine fueled at least in part with a biodiesel fuel which comprises operating the engine with a lubricating oil composition contaminated with at least about 0.3 wt% of a biodiesel fuel or a decomposition product thereof, based on the total weight of the lubricating oil composition, wherein the lubricating oil composition comprises a major amount of base oil of lubricating viscosity; and a Mannich condensation product.

Other embodiments will be in part apparent and in part pointed out hereinafter.

Definitions

To facilitate the understanding of the subject matter disclosed herein, a number of terms, abbreviations or other shorthand as used herein are defined below. Any term, abbreviation or shorthand not defined is understood to have the ordinary meaning used by a skilled artisan contemporaneous with the submission of this application.

"Biofuel" refers to a fuel (*e.g.*, methane) that is produced from renewable biological resources. The renewable biological resources include recently living organisms and their

metabolic byproducts (*e.g.*, feces from cows), plants, or biodegradable outputs from industry, agriculture, forestry and households. Examples of biodegradable outputs include straw, timber, manure, rice husks, sewage, biodegradable waste, food leftovers, wood, wood waste, wood liquors, peat, railroad ties, wood sludge, spent sulfite liquors, agricultural waste, straw, tires, fish oils, tall oil, sludge waste, waste alcohol, municipal solid waste, landfill gases, other waste, and ethanol blended into motor gasoline. Plants that can be used to produce biofuels include corn,