J Fundam Renewable Energy Appl 2018, Volume 8
DOI: 10.4172/2090-4541-C4-060

11th World Bioenergy Congress and Expo

July 02-04, 2018 | Berlin, Germany

A New Generation of Biodiesel Formulation with Unprecedented Properties

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Vegetable oils are the most available source of biomass that could be used as biofuels. However, their high viscosities and melting points cause many problems that make a direct usage in engines very difficult. Therefore, they are further processed to fatty acid methyl esters by a transesterification reaction with methanol. The resulting biodiesel still has a high melting point and the chemical conversion leads to huge amounts of glycerol as a by-product that is not easy to valorize. To solve the aforementioned problems, we successfully formulated a new type of biofuel mixture (patent pending). It is composed of a) a typical vegetable oil, b) a classical biodiesel (or diesel), and c) a very cheap glycerol derivative. In this way, we could overcome miscibility and viscosity problems even at low temperatures and this without any surfactants. The engine tests of the final formulations consisted of ignition delay, emission and consumption measurements as well as investigations on their combustion processes. It turned out that the formulated biofuels are very close to conventional diesel concerning their ignition delay and combustion properties. Surprisingly, the gaseous as well as soot emissions are also comparable to or even lower than those of diesel. Especially at higher boost pressures, the formulated biofuels show distinctly less emissions than diesel. Even if the biofuels lead to slightly higher consumptions, their costs are very price competitive, which compensates this drawback.

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