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Extended Abstract

Effect of Temperature and Composition on Viscosity of Different Formulation of Ethyl Levulinate/Diesel Fuel/Biodiesel †

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Alkyl esters of levulinic acid have significant potential as blend components in diesel formulations. Compared with biodiesel, esters of levulinic acid have high oxidative stability, good low temperature properties and do not have a tendency for gum formation [1]. Different formulations of alkyl levulinates and biodiesel has been studied as transportation fuels in order to improve emissions of nitrogen oxides in high compression diesel engines. Moreover, technological initiatives are being taken to use ethyl levulinate as a 100% biodegradable neat fuel in the near future [2]. Consequently, the development of new routes for the production of levulinates from bio-based platform molecules has attracted ever more attention [1].

Viscosity is a key properties of automotive and aircraft fuels, because influences the lubrication properties as well as the combustion properties of the fuel. Low viscosities lead to poor lubrication, which can cause excessive wear and leakage. Meanwhile, a higher viscosity generates an obstruction for hoses or poor atomization of the fluid, leading to poor combustion and an increase in exhaust gas emissions [3].

The objective of this paper is to evaluate the effect of ethyl levulinate addition over fuel viscosity. The viscosity of different formulation of ethyl levulinate/diesel fuel/biodiesel was determined at temperature range 30–80 °C. The ethyl levulinate and biodiesel tested were synthesized in our laboratory. The Artificial Neural Network (ANN) was used as a modelling tool, for understanding the correlation between temperature and viscosity property of fuel mixtures. Several architectures were tested until a good match between the ANN's predictions and the experimental data was found.

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