Impact of antioxidant additives on the oxidation stability of biodiesel produced from Croton Megalocarpus oil

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Abstract

The increase in crude petroleum prices, limited resources of fossil fuels and environmental concerns have led to the search of alternative fuels, which promise a harmonious correlation with sustainable development, energy conservation, efficiency and environmental preservation. Biodiesel is well positioned to replace petroleum-based diesel. Biodiesel is a non-toxic, biodegradable and renewable biofuel. But the outstanding technical problem with biodiesel is that, it is more susceptible to oxidation owing to its exposure to oxygen present in the air and high temperature. This happens mainly due to the presence of varying numbers of double bonds in the free fatty acid molecules. This study evaluates oxidation stability of biodiesel produced from Croton megalocarpus oil. Thermal and Oxidation stability of Croton Oil Methyl Ester (COME) were determined by Rancimat and Thermogravimetry Analysis methods respectively. It was found that oxidation stability of COME did not meet the specifications of EN 14214 (6 h). This study also investigated the effectiveness of three antioxidants: 1,2,3 tri-hydroxy benzene (Pyrogallol, PY), 3,4,5-tri hydroxy benzoic acid (Propyl Gallate, PG) and 2-tert butyl-4-methoxy phenol (Butylated Hydroxyanisole, BHA) on oxidation stability of COME. The result showed that the effectiveness of these antioxidants was in the order of PY > PG > BHA.

Keywords

Croton Oil; Biodiesel; Oxidation stability; Fuel properties