

Study of Biodiesel & Biodiesel Blends Deterioration Mechanism

Abstract

Biodiesel is receiving increasing attention as an alternative, non-toxic, biodegradable, and renewable diesel fuel. Due to its chemical structure, it is more susceptible to deteriorate during storage upon exposure to air and under high temperature (heat) condition. The aim of this paper was to clarify the deterioration mechanism of biodiesel and biodiesel blends focusing on Soy Methyl Ester (SME). This study examined the deterioration of SME biodiesel and biodiesel blends under condition 140°C heating and 285.7/hour aeration rate for 24 hours. The results showed 2 layers of fuel as upper layer and sludge as bottom layer were formed after deterioration. Fuel analysis results showed a drastic increase in the acid value, viscosity, oxidation product compound when the fuel deteriorated after 24 hours. Deterioration compound were examined by GC-MS and FD-MS analysis which demonstrated that aldehyde, ketones, short chain carboxylic acids as dominant compounds. The mechanism of biodiesel deterioration (e.g. primary oxidation, secondary oxidation and sludge formation) has been discussed. This finding provided useful information to both biodiesel producers and users for improving biodiesel storage system to maintaining biodiesel quality are related to corresponding deterioration mechanisms.