

The Equilibrium Solubility Behavior of Glycerol in Biodiesel Fuels



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by

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The Equilibrium Solubility Behavior of Glycerol in Biodiesel Fuels-Abstract

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Low level free glycerin (FG) residuals in B100 are limited to 200ppm by internationally recognized specifications dating back to the mid 1990's. FG easily escapes detection because of interferences from diesel fuel hydrocarbons while using standard analysis methodology, such as ASTM D6584 or EN14105 without suitable procedural and methodology adjustments, or GCMS. Similar interferences thwart routine checks of FG in biodiesel blends by such methods, and can destroy the validity of an analysis of fuel, such as B99.

We reported earlier that the solubility of glycerol in polished biodiesel is much lower than previously thought, and can cause a variety of unexpected effects due to its density, high viscosity and biodegradability¹. In addition to temperature, several compositional entities can potentially influence the solubility of glycerol. Data from more recent studies of blend strength and the aromatic content of hydrocarbon diesels at different temperatures using model fuel compositions is presented along with comparisons to our earlier solubility data for saturated monoglycerides.

Results show that in addition to temperature and interacting impurities, such as moisture¹, blend composition looms as an important modulator of solubility. However, the anticipated gradual increases in solubility due to increasing FAME%, are surprisingly small in blends below about 50%, and are further attenuated by declining temperatures. This indicates formation of heterophases can be induced by blending.

¹ Heiden, Schober, Mittelbach, JAOCS, 2017.