Effects Of Biodiesel By- Products And Different Manufacturing Process On Interfacial Tension And Water Separation Properties Of Biodiesel-Ultra Low Sulfur Diesel Blends

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ABSTRACT

Triglycerides react with methanol in the presence of sodium or potassium hydroxide catalysts to produce fatty acid methyl esters (FAME), or biodiesel and glycerol. When the reactants are not fully converted in the process, contamination of biodiesel by fatty acids, methanol, and glycerol, as well as incompletely reacted mono-, di-, and tri-glycerides, takes place. The presence of biodiesel in fuel blends has disabled the capability of commercial fuel-water separation devices to remove water from diesel fuel. This is expected, as biodiesel is a surfactant, and surfactants enhance emulsion stability. However, biodiesels from differing manufacturing processes and raw material sources have been found to exert varying levels of negative impact on water separation. This variation suggests that other species within the biodiesel may be responsible for some of the emulsion-stabilizing properties; and these species affect the interfacial tension (IFT) and water separation properties of the blend. A previous study examined the impact of fatty acids and glycerol monoolein (GMO) on IFT and water separation of biodiesel - Ultra Low Sulfur Diesel (ULSD) blends. In that work, GMO was found to decrease dramatically the interfacial tension of fuel blends containing as little as 1000 ppm and to disarm commercial fuel water separators. The present study continues the investigation of the impact of GMO on filter element water removal performance in the SAE J1488 Emulsified Water/Fuel Separation test when dosed incrementally to ULSD and kerosene. The impact of GMO on interfacial tension was also studied. The goal of the work was to evaluate the efficacy of GMO limits in current ASTM standards for B100 and B6-B20 fuel blends; and to assess the value of GMO as a standardized fuel additive for use in industry test methods.

BIOGRAPHY, SHORT SKETCH

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Diani joined Ahlstrom Filtration in 2007 as a Research Associate in support of the Ahlstrom R&D focus on media development for advanced diesel filtration products. She has a Bachelor of Science degree in Chemical Engineering from Purdue University where her undergraduate research focused on the development of chlorine dioxide based sterilization methods for food filtration media. She has submitted one patent and presented papers at the American Filtration Society 2009 Annual conference and FILTECH 2009.