

New Coalescence Media for Separation of Water from High Surfactant Content Ultra Low Sulfur Diesel and Biodiesel Blends

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ABSTRACT

Emergence of fatty acid methyl esters (biodiesel) as a diesel fuel blend component, as well as fuel additization for management of mandated fuel sulfur reductions, have resulted in dramatic increases in fuel surfactant levels. This step change in fuel surfactancy has given rise to consistent failures of conventional separation and coalescence media used for separation of water from diesel fuel. Reported here are results of coalescing media development efforts that focused on treating fuel-water separation as an adsorption based or liquid-solid separation problem. Stationary phase surface area invariably promotes separation in adsorption based regimes. Media were developed with 60 and 160 fold increases in surface area relative commercial separation media currently used for this application. Media were tested in 7 (B7), 20 (B20), and 40 (B40) percent biodiesel in ultra low sulfur diesel blends. Developed media yielded unadjusted time weighted average water removal efficiency in flat sheet SAE J1488 fuel-water separation tests of 96% (B7), 88, 91% (B20), and 84% (B40). In B20, fuel accepts were clean and bright with water content between 220-255 ppm. As such, in flat sheet tests in B20, the media appeared compliant with EN 590 (2005). Adjusted for dissolved water content, B40 performance was 90%. Under the same test conditions, unadjusted time weighted average water removal efficiency of conventional coalescence media was 74% (B7) , 68% (B20), and 68% (B40) and traditional barrier media was 70, 83% (B7) and 50% (B40). In no case was fuel exiting the media clean and bright. Results support the role for high surface area media in successful removal of water from Biodiesel-Ultra Low Sulfur Diesel blends. Results indicate that developed media can be used to effectively remove water from biodiesel blends.