

Spray Characterization of Palm Olein/Diesel Blends under Various Injection Pressures

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Abstract

The Sauter Mean Diameter (SMD) and spray cone angle are two important parameters that characterize spray performance. The objective of this study is to characterize palm olein/diesel blends spray in terms of spray angle and SMD under different injection pressures using a hollow cone pressure swirl atomizer. The physical properties of five diesel/palm olein blends, namely B5, B10, B15, B20 and B25 were measured and their spray characteristics were tested at injection pressures of 0.8 MPa, 1 MPa, and 1.2 MPa under ambient atmospheric condition. The results were compared to spray established using petroleum diesel fuel. The SMD was measured using a phase Doppler analyzer (PDA). The spray cone angle was visualized using a digital single-lens reflex (DSLR) camera. The results indicated that petroleum diesel fuel had the widest cone angle followed by B5, B10, B15, B20 and B25 under the same injection pressure. Additionally, when the injection pressure increases from 0.8 MPa to 1.2 MPa, the spray cone angle widens accordingly. It is concluded that high content of palm olein in the palm biofuel blends increases viscosity and surface tension and hence higher value of SMD and narrower spray cone angle was generated. An increase in injection pressure resulted in smaller droplet SMD and wider spray cone angle.

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