

Experimental investigation of spray characteristics of refined bleached and deodorized palm oil and diesel blends using phase doppler particle alyzer

Abstract

The unstable oil prices in the world market lead many countries to seek an alternative fuel to substitute petroleum oil. Palm oil derived fuel is one of such alternatives, which can be used as fuel in several methods, such as preheating, blending with other petroleum fuels, trans-esterification and etc. The objective of this paper is to characterize the spray of the refined, bleached, and deodorized palm oil (RBDPO) and diesel blends. Five blends B5, B10, B15, B20 and B25 were physically blended using lab scale dynamic double propeller mixer and the main physical properties (density, viscosity and surface tension) that have the main effect on the spray pattern were measured. A phase doppler particle analyzer (PDPA) was used to characterize the spray including particles Sauter mean diameter (SMD). Direct photography was used to determine the spray angle for the different blends. Results show that as the percentage of RBDPO increases in the blend, the SMD increases and the spray angle decreases. The percentage increase in the SMD from B0 to B25 was approximately 15% while the decrease in the spray angle is 9.44° . It can be concluded that the blends B5 and B10 could be used in the power engines without fuel system modification. However evaluation of the combustion performance should be done for all blends.