Cold flow and fuel properties of methyl oleate and palm-oil methyl ester blends

ABSTRACT

Biodiesel is a renewable, alternative diesel fuel derived from various oils or fats through transesterification. Biodiesel usually consists of alkyl esters of the parent oil. Palm-oil methyl ester (PME) is a prominent biodiesel in Southeast Asian countries such as Malaysia and Indonesia, which have a surplus production of palm oil. However, given the substantial amount of saturated fatty acids in palm oil, its methyl ester has poor cold-flow characteristics. In the present study, the physicochemical properties of specified blends of technical-grade methyl oleate (MO) and PME, namely, PME80/MO20, PME70/MO30, PME60/MO40, and PME50/MO50 (vol/vol%) were studied. The aim was to determine the optimum blend and achieve better cold-flow properties than neat PME. Differential scanning calorimetry analysis showed that increasing the MO proportion until 50% (vol%, vol%) led to maximum improvements in cloud point and cold filter plugging point, which were reduced to 70.38% and 91.69%, respectively. Important fuel properties (i.e., cetane number (CN), kinematic viscosity, density, gross heating value, net heating value, flash point, oxidation stability, and acid value) were also examined. All fuel properties of PME–MO blends were observed within the specified permissible limits of biodiesel standard (ASTM D 6751).

Keyword: Palm oil; Methyl oleate; Cold-flow properties; Physico-chemical properties; Blending