Estimation of the refractive index of diesel fuel+biodiesel blends

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Abstract For now, biodiesel is the commonly accepted biofuel as a substitute for diesel fuel in internal combustion engines. Diesel fuel blends with up to 20% biodiesel can be used in diesel engines without any modification. A lot of studies regarding diesel fuel+biodiesel blends properties are presented in the literature. Some of the important properties of diesel fuel+biodiesel blends can be evaluated from other blends properties. For example, density and viscosity of biodiesel blends can be predicted based on blend refractive index. More than that, refractive index can be used as a reliable physical property to predict transesterification reaction progress. As a result, the refractive index of diesel fuel+biodiesel blends is important in order to characterize these blends or to monitor the evolution of transesterification process of vegetable oils or animal fats. The refractive index of diesel fuel+biodiesel blends can be experimentally determined or evaluated based on refractive indices of diesel fuel and biodiesel. The aim of this study was to estimate the accuracy of refractive index of diesel fuel +biodiesel blends calculation, using models initially proposed to evaluate the refractive index of a binary liquid mixture. It was shown that the refractive index of diesel fuel+biodiesel blends can be accurately predicted from refractive indices of the components of the blend. Wiener, Heller and Edward equations can be recommended to predict with a great accuracy the refractive index of diesel fuel+biodiesel blends.

Keywords: Biodiesel, diesel fuel, refractive index, models.
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