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Research of the physicochemical properties of biodiesel from grape seed oil as an alternative energy source

ABSTRACT

In order to reduce fossil fuel consumption and harmful emissions to the environment, the oil obtained from grape seeds, which is separated as waste after wine production, was used as a raw material for biodiesel production as an alternative fuel at "GANJA SHERAB-2" operating in Azerbaijan. 60.0% mass petroleum-based diesel was obtained from the hydrocracking of fuel oil, and 92.9% biodiesel was obtained from the transesterification of grape seed oil. B20, B40, B60 compositions were prepared from diesel and biodiesel. The cetane number of the diesel fraction was determined to be 50.4 units. The addition of grape seed oil biodiesel led to an increase in the cetane number. The cetane number of the B20 composition is 51.8, the B40 composition is 53.2 and the B60 composition is 54.7. The kinematic viscosity of diesel, biodiesel, B20, B40 and B60 fuels is 3.1121, 3.2611, 3.4321, 3.5811, 4.7645 mm^2/s, respectively. Kinematic viscosity of fuels: petroleum-based diesel, B20, B40 and B60 meets the requirements of the PN-EN-590 standard, while the kinematic viscosity of grape seed oil biodiesel meets the requirements of the PN-EN 14214 standard. According to the international standard PN-EN ISO 3104, the viscosity range for biofuels should be between 1.9 and 6.0 mm^2/s. It was shown that the kinematic viscosity of B20, B40 and B60 biodiesel compositions corresponds to this range. Grape seed oil can be used as an economically viable and environmentally friendly natural raw material source in the production of biodiesel as an alternative fuel. At the same time, it is recommended to add the obtained biodiesel as an ecological component to diesel fuels and use it as an environmentally friendly fuel in vehicles.

Keywords: biodiesel, diesel, transesterification, grape seed, fuel oil, cetane number

BIOGRAPHY

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