



ASSESSMENT OF PHYSIOCHEMICAL PROPERTIES OF ETHANOL-DIESEL FUEL BLENDS

Chandrasiri Y. S.¹, Weerasinghe W.M.L.I.¹, Madusanka D.A.T.¹,
and Manage P.M.^{1,2*}

¹Centre for Water Quality and Algae Research, University of Sri Jayewardenepura

²Faculty of Graduate Studies, University of Sri Jayewardenepura
pathmalal@sjp.ac.lk

Abstract

Bioethanol is considered as a potential solution for future energy crisis as an alternative fuel because it is used as an automotive fuel directly in specially designed engines or used as a fuel extender by blending with diesel. To assess the compatibility of bioethanol as an alternative fuel, four ethanol-diesel blends were prepared by mixing ethanol with Lanka Grade 02 Auto Diesel through stirring and sonication. Hence, ethanol was partially miscible with diesel ethanol-diesel emulsions were obtained. The physiochemical properties critical for the commercial use of these blends were tested by Ceypetco refinery laboratory. Accordingly, density values of E2, E5, E7, and E10 blends were varied as 827.7 kg m⁻³, 827.4 kg m⁻³, 827.0 kg m⁻³, and 826.5 kg m⁻³ respectively. Flash point values of E2 were 35 °C and less than 30 °C for E5, E7, and E10 blends. The lubricity values of the blends E2, E5, E7 and E10 were measured in HFRR wear scar diameter at 60 °C and the values were varied as 370, 390, 420, and 430 respectively. The sulphur content of the blends were recorded as; E2 (223 mg kg⁻¹), E5 (224 mg kg⁻¹), E7 (217 mg kg⁻¹) and E10 (217 mg kg⁻¹). Viscosity values (at 40 °C) of the blends were 3.470 cSt for E2, 3.160 cSt for E5, 2.902 cSt for E7 and 2.386 cSt for E10 where the calorific values of the E2, E5, E7, and E10 blends were 11321.0 Kcal kg⁻¹, 11172.0 Kcal kg⁻¹, 11034.0 Kcal kg⁻¹, and 11139.0 Kcal kg⁻¹ respectively. The results revealed that all the ethanol-diesel blends complied with Ceypetco standards for calorific value, viscosity, density, lubricity and sulphur content except the flashpoint. Thus the results of the present study emphasized that lower ethanol-diesel blends are a promising alternative to automotive fuels.

Keywords: *Bioethanol, energy crisis, alternative fuel, ethanol-diesel blends, physiochemical properties*