

# A Comparative Study of the Combustion Characteristics of Diesel, Kerosene, Biodiesel and Biodiesel Blends Using Laminar Diffusion Flame

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## Abstract

Biodiesel is arising renewable substitute for conventional diesel fuel. Therefore, this research has paid attention about the behavior of selected physical parameters of biodiesel when blends with diesel and compare the rate of soot formation, rate of fuel consumption and fuel to soot conversion percentage of diesel, kerosene, biodiesel and biodiesel- diesel blends using a laminar diffusion flame.

In this research, Soybean biodiesel was synthesized using transesterification reaction with the yield of 98% (v/v). Furthermore, biodiesel – diesel blends were prepared and their fuel properties such as density, kinematic viscosity, flash point, cetane index and fuel distillation temperatures were characterized following ASTM methods. Based on this experimental results, two mathematical relationships were developed to estimate the density and kinematic viscosity of any biodiesel-diesel blend. A linear relationship between density and blending ratio of biodiesel with diesel was found whereas the viscosity showed an exponential relationship with blending ratio.

According to the experimental results under steady laminar axisymmetric diffusion flame, the highest soot formation rate was found in diesel fuel and highest fuel consumption rate was found in kerosene. The fuel to soot conversion was highest in 6% biodiesel blend. However, the rate of soot formation, fuel to soot conversion percentage and rate of fuel consumption were lowest in biodiesel.

**Keywords:** soot, biodiesel, blends, laminar diffusion flame