
A Study on Spray Characteristics of High Ethanol Content-Diesel Fuel Blended using Constant Volume Chamber

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The purpose of this study is to analyze the fuel spray characteristics of high-concentration ethanol blends mixed with diesel under variations of fuel injection pressure and ambient pressure. Ethanol poses a low-carbon, high-oxygen concentration which makes it a promising alternative fuel for internal combustion (IC) engines. In this study, the spray characteristics of fuel was captured in constant volume chamber (CVC) by using high-speed camera. Due to low lubrication of characteristics of ethanol, a mixture of diesel was added into blended fuel. The high concentration of ethanol from 50% ~ 100% was used in into ethanol-diesel mixture. The triangle method was implemented to show the phase separation results of sample fuels. Due to the high density of the fuel, the injection pressure of 80MPa to 120MPa and ambient pressure of 1.5, 3 MPa was used in this study. The results showed that ethanol addition changes the physical and chemical properties of the fuel, reducing density, viscosity, and surface tension. As a result, the spray penetration distance decreased, and the spray cone angle increased. Blended fuels with lower viscosity and surface tension showed larger spray cone angles, while blended fuels with higher density showed increased penetration length.

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