Tri-fuel (diesel-biodiesel-ethanol) emulsion characterization, stability and the corrosion effect

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IOP Conference Series: Materials Science and Engineering

2017, 257, 12082

This paper presents the result of experimenting emulsified tri-fuel in term of stability, physico-chemical properties and corrosion effect on three common metals. The results were interpreted in terms of the impact of five minutes emulsification approach. Tri-fuel emulsions were varied in proportion ratio consist of biodiesel; 0%, 5%, 10%, and ethanol; 5%, 10%, 15%. Fuel characterization includes density, calorific value, flash point, and kinematic viscosity. Flash point of tri-fuel emulsion came with range catalog. Calorific value of tri-fuel emulsion appeared in declining pattern as more ethanol and biodiesel were added. Biodiesel promoted flow resistance while ethanol with opposite effect. 15% ethanol content in tri-fuel emulsion separated faster than 10% ethanol content but ethanol content with 5% yield no phase separation at all. Close cap under static immersion with various ratio of tri-fuel emulsions for over a month, corrosiveness attack was detected via weight loss technique on aluminum, stainless steel and mild steel.