

Experiment of Oxygenated Fuel on Diesel Engine: Properties, Performance and Emission

Hazman Abu Hassan 1, Rizalman Mamat 2*, Ftwi Y. Hagos 2, Gholamhassan Najafi 3

¹ Department of Chemical Petrol Engineering, Polytechnic Tun Syed Nasir (PTSN)
84600 Pagoh, Johor Malaysia

² Faculty of Mechanical Engineering Universiti Malaysia Pahang (UMP)
26600 Pekan, Pahang Malaysia

³ Department of Mechanics of Biosystem Engineering, Tarbiat Modares University, Tehran, Iran
*rizalman@ump.edu.my

Abstract:

Diesel engines have been found to produce a wide range of complex hazardous gases, especially at high load. Moreover, diesel exhaust also contains a variety of heavy metal gases including aerosols and soot, sulfates, metallic abrasion particles, silicates and ash particulates. The main purpose of the study was to characterise the effects of diesel, biodiesel blends B5M10 and B10M10 and emulsion fuels B5M10E3 and B10M10E3 as fuels for the impact on gas emission. Engine tests have been performed to obtain results of fuel properties, engine performance and gas emission with various cycles. The B5M10E3 produces lower NO_x emission results than B10M10E3 as biodiesel fuel increases the combustion temperature. In conclusion, biodiesel blends can actually reduce gas emissions compared to diesel but increase NO_x emissions. Therefore, emulsion fuels B5M10E3 and B10M10E3 can be the best alternative fuel for the future.

Keywords: Sulfates, Metallic abrasion particles, Fuel properties; diesel; biodiesel; emulsion

References

- 1.EPA, Clean Diesel Trucks, Buses, and Fuel: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements. United States Environmental Protection Agency, 2000.
- 2.Hossain, F.M., et al., Investigation of microalgae HTL fuel effects on diesel engine performance and exhaust emissions using surrogate fuels. *Energy Conversion and Management*, 2017. 152(September): p. 186-200.
- 3.Nabi, M.N., et al., Reductions in diesel emissions including PM and PN emissions with diesel-biodiesel blends. *Journal of Cleaner Production*, 2017. 166: p. 860-868.
- 4.Nair, J.N., A.K. Kaviti, and A.K. Daram, Analysis of performance and emission on compression ignition engine fuelled with blends of Neem biodiesel. *Egyptian Journal of Petroleum*, 2017. 26(4): p. 927-931.
- 5.Zhang, Z.H. and R. Balasubramanian, Effects of oxygenated fuel blends on the composition of size-segregated engine-out diesel particulate emissions and on the toxicity of quasi-ultrafine particles. *Fuel*, 2018. 215(September 2017): p. 161-170.

