

Performance and Emission Characteristics of Lime treated Biogas in Dual Fuel Mode in Single Cylinder Diesel Engine using Electronic Fuel Injector

M.Ravi¹, KCK.Vijayakumar², P.Arun prasath³, S.Aswin⁴

¹Department of Mechatronics, K.S. Rangasamy College of Technology,
Tiruchengode, Tamilnadu, India

²Vivekananda Institute of Engineering and Technology for Women,
Tiruchengode, Tamilnadu, India

^{3&4}Department of Mechatronics, K.S. Rangasamy College of Technology,
Tiruchengode, Tamilnadu, India

Abstract: This paper present the diesel engine characteristics operated with dual fuel mode (Diesel and Lime treated Biogas) injected through electronic fuel injection system. Biogas, composed principally of methane, has limited use in energy generation due to the presence of carbon-dioxide (CO₂).Biogas cannot be burned directly in the combustion chamber as CO₂ presence causes corrosion in the reaction chamber. There are various technologies to reduce CO₂ in the biogas, most of which are chemical based, expensive and are limited in use. Lime treatment is the one of the methods to enrich CH₄ in the biogas.

During experimentation the engine is made to run with diesel and lime treated biogas and the investigations are done. The engine performance is measured in terms of the brake thermal efficiency and exhaust emission is measured in terms of carbon di-oxide (CO₂), carbon mono-oxide (CO), and hydrocarbon (HC). It is found that the break thermal efficiency of electronic injection of lime treated biogas and diesel increases by 2% when compared with manifold injection of lime treated biogas and diesel. It is obtained that dual fuel engine with lime treated biogas injected through electronic injection system showed a reduction in emission of carbon mono-oxide by 9% on comparison with manifold injection of lime treated biogas and diesel and also the emissions of CO₂ were found to be reduced to 0.5%, the HC emission was found to be reduced by 10%, the smoke emissions were found to be reduced by 2% and the NO_x emissions were found to be increased by 15% with that of the manifold injection system. Thus the electronic injection of lime treated biogas and diesel improves the efficiency of the engine and reduces the various emissions from the vehicle.

Keywords: Electronic fuel injection, Manifold injection, Lime treated Biogas, Emission and Performance Characteristics.