



Combustion Characteristics and Engine Performance of Pyrolytic-Oil from Selected Biomass Materials

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Abstract

The combustion characteristics of pyrolytic oil produced from Apa (*Azelia africana*), Iroko (*Milicia excelsa*) and palm kernel (*Eleais guneensis*) shells were investigated with a view to establish the possibility of using their bio-oil as fuel in combustion engines. The biomass materials were converted to pyrolytic oil in a fixed-bed reactor at different temperatures, viz: 400°C, 500°C, 600°C, 700°C and 800°C. Combustion characteristics of the pyrolytic oil (pyrolytic yield, viscosity, flash point and pour point) were examined. The performance of the bio-oil in an internal two stroke combustion engine at various blends of pyrolytic oil was tested in Plint Lister Test Bed to determine basic mean effective pressure (BMEP) and exhaust gas temperature of the oil. The bio-oil yield ranged from 41.01% to 46.7%, flash point was from 56.6±1.53° to 95.67±1.53°C and pour point ranged from 3.4±0.00°C to 4.15±0.18° C. The BMEP ranged from 100 kN/m² to 810 kN/m² for the pyrolytic oil produced from plant residues. The BMEP and exhaust gas temperature of the pyrolytic oil increased with the brake load. The exhaust gas temperature of the pyrolytic oil is higher than that of the conventional fossil fuel; this has been found to increase with brake load on the engine.

Key word: Fixed bed reactor, Pyrolytic oil and BMEP