Product Yield Distribution and Characterization of Bio-Oil from West African Cordia Sawdust Pyrolysis

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Abstract
The quest for energy generation in the most environmentally friendly way has necessitated the conversion of agricultural residues, believed to constitute nuisance to the environment, into useful bio-fuels. Pyrolysis of West African Cordia (Cordia millenii) sawdust was carried out in a purposely built tubular carbon steel reactor under N_2 atmosphere within the temperature range of 410 and 530 ^oC. Proximate and elemental analyses were also performed on the raw sample using iso-conversional methods. Product yields were collected at 30 ^oC interval. Bio-oil yield was characterized by using analytical Py-GC/MS technique. The Higher Heating Value (HHV) of the sample was found by using Parr bomb calorimeter while that of char yield was theoretically determined. The highest yield of pyro-oil was 63.4% at 500 oC, that of pyro-gas was 30% at 500 ^oC and that of char was 35% at 410 oC. The proportion of phenolic compounds identified was more than 75% with trans-2-octadecadecen-1-ol, cis-10-pentadecen-1-ol, 9-octadecenal, methyl-1-cyclohexenyl ketone showing dominance. The HHV of the raw sample and char yield were 18.07 and 18.95 MJ/kg, respectively.

Keywords: Biomass, analytical py-GC/MS, pyrolysis, bio-fuel, fixed bed reactor.
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