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Analysis of Bio-Oil Produced from Sugar Cane Bagasse Pyrolysis

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Abstract : Currently, fossil fuel is supplying most of world's energy resources. However, fossil fuel resources are depleted rapidly and require an alternative energy to overcome the increasing of energy demands. Bio-oil is one of a promising alternative renewable energy resources which is converted from biomass through pyrolysis or fast pyrolysis process. Bio-oil is a dark liquid fuel, has a smelling smoke and usually obtained from sugar cane, wood, coconut shell and any other biomass. Sugar cane content analysis showed that the content of oligosaccharide, hemicellulose, cellulose and lignin was 16.69%, 25.66%, 51.27% and 6.38% respectively. Sugar cane is a potential sources for bio-oil production shown by its high content of cellulose. In this study, production of bio-oil from sugar cane bagasse was investigated via fast pyrolysis reactor. Fast pyrolysis was carried out at 500 °C with a heating rate of 10 °C and 1 hour holding time at pyrolysis temperature. Physical properties and chemical composition of bio-oil were analyzed. The viscosity, density, calorific value and molecular weight of produced bio-oil was 3.12 cp, 2.78 g/cm3, 11,048.44 cals/g, and 222.67 respectively. The Bio-oil chemical composition was investigated using GC-MS. Percentage value of furfural, phenol, 3-methyl 1,2-cyclopentanedione, 5-methyl-3-methylene 5-hexen-2-one, 4-methyl phenol, 4-ethyl phenol, 1,2-benzenediol, and 2,6-dimethoxy phenol was 20.76%, 16.42%, 10.86%, 7.54%, 7.05%, 7.72%, 5.27% and 6.79% respectively.

Keywords : bio-oil, pyrolysis, bagasse, sugar cane, gas chromatography-mass spectroscopy
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