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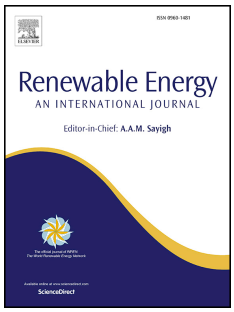

Pyrolysis behavior of rice straw under carbon dioxide for production of bio-oil

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Pyrolysis behavior of rice straw under carbon dioxide for production of bio-oil

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Abstract

Pyrolysis is an important thermo-chemical method for effective utilization of lignocellulosic biomass. The pyrolysis of rice straw has been carried out using fixed bed reactor under CO_2 environment at temperatures ranging from 300 to 450°C to study the effect of CO_2 and temperature. The maximum oil yield (34.5 wt. %) was obtained at 400°C. The solid residue yield decreased when the temperature increased from 300 to 450°C, while the gas yields increased. The results showed that both the temperature and reaction atmosphere had an influence on the product distribution and nature of the products. The main compounds observed in the bio-oil were phenol, 2-ethyl-Phenol, 2-methyl-Phenol, 2-methoxy-Phenol, 2-Methoxy-4-vinylphenol, 2, 6-dimethoxy-Phenol. Liquid product obtained from pyrolysis of rice straw showed high proton percentage from region 1.5 to 3.0 ppm, around 31-34.5 % of protons resonate in this region indicating that the liquid products have high aliphatic proton content. Bio-oil produced at 400°C indicated the higher proton percentage 34.5% in this region (1.5 to 3.0 ppm), higher than the other conditions. The bio-chars were amorphous in nature. The SEM images revealed that with increase in temperature, the