

Catalytic and Non-Catalytic Pyrolysis of Walnut Shell Waste to Biofuel: Characterisation of Catalytic Biochar and Biooil

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Abstract : Walnut is an important export product from the Union Territory of Jammu and Kashmir. After extraction of the kernel, the walnut shell forms a solid waste that needs to be managed. Pyrolysis is one interesting option for the utilization of this walnut waste. In this study microwave pyrolysis reactor is used to convert the walnut shell biomass into its value-added products. Catalytic and non-catalytic conversion of walnut shell waste to oil, gas and char was evaluated using a Co-based catalyst. The catalyst was characterized using XPS and SEM analysis. Pyrolysis temperature, reaction time, particle size and sweeping gas (N₂) flow rate were set in the ranges of 400–600 °C, 40 min, <0.6mm to < 4.75mm and 300 ml min⁻¹, respectively. The heating rate was fixed at 40 °C min⁻¹. Maximum gas yield was obtained at 600 °C, 40 min, particle size range 1.18-2.36, 0.5 molar catalytic as 45.2%. The liquid product catalytic and non-catalytic was characterized by GC-MS analyses. In addition, the solid product was analyzed by means of FTIR & SEM.

Keywords : walnut shell, biooil, biochar, microwave pyrolysis

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