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EFFECT OF HYDROTHERMAL AND VAPOTHERMAL CARBONIZATION OF WET BIOMASS WASTE ON BOUND MOISTURE REMOVAL AND COMBUSTION CHARACTERISTICS

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Abstract

The upgrade of wet biomass sources into char presents a big challenge and is deemed as a non-feasible process in many cases using the conventional thermal carbonization. Hydrothermal carbonization (HTC) and vapothermal carbonization (VTC) are promising techniques for wet biomass carbonization since no pre-drying is required. Two types of wet biomass waste materials were investigated, bagasse (BG) and lime peel (LP), with moisture content of 67% and 78%, respectively. Experimental test rig was developed to study the effects of HTC and VTC processes on the raw materials in terms of product properties and combustion characteristics. For HTC process, water-to-biomass (W/B) ratio showed a significant effect on the product heating value with 10.2% difference for BG and 6.6% for LP through the W/B tested range. On the other hand, VTC process provided a significantly higher elevation in heating value up to 33% and 32% for BG and LP, respectively, compared to 20% and 16% for the HTC process.

Keywords: Hydrothermal; Vapothermal; Wet biomass; Solid fuel; Drying performance; Combustion characteristics.

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