

Effect of alkaline pretreatment on the thermal behavior and chemical properties of rice husk varieties in relation to activated carbon production

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Abstract

Thermal behavior and chemical properties of selected raw and NaOH-pretreated rice husk varieties were investigated. NaOH-pretreatment process involved soaking 5 g rice husk samples in 40 mL of 2%w/v NaOH, shaking (400 rpm) and heating (50 °C) for 3 h. NaOH-pretreated samples were water-washed, oven-dried, and milled for use in the determination of their thermal behavior and surface functional groups. Alkaline wash-water was also analyzed for sugar components. Thermal decomposition temperatures, degradation rates, and the subsequent mass losses varied from one rice husk variety to another. These thermal properties increased after NaOH-pretreatment of the rice husk varieties, reducing their char yields (17.1–20.4% db). These changes mainly had to do with the lignin, hemicellulose, and ash removal from the rice husk varieties, as confirmed by their FTIR analysis, as well as by the sugar composition analysis of their alkaline wash-water. Consequently, the FTIR spectra differed between the raw and NaOH-pretreated rice husk varieties.