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INFLUENCE OF INHERENT ALKALI CONTENT AND SURFACE AREA OF BIOMASS CHAR ON ITS CO_2 GASIFICATION REACTIVITY

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Abstract

The CO_2 gasification reactivity of oil palm shell (OPS) char and pistachio nut shell (PNS) char was studied under isothermal condition using Thermogravimetric analysis (TGA). The effects of temperature, inherent alkali content and surface area of each biomass char on promotion of CO_2 gasification reactivity were investigated. The achieved results revealed the profound catalytic effect of alkali, alkaline and transition metals including K, Na and Fe available in the ash of biomass on enhancing the gasification reactivity of the char at temperatures below 900 °C. However, at elevated temperatures the pore diffusion was dominant and controlled the gasification reactivity. It was found that at temperatures below 900 °C, PNS char demonstrated higher gasification reactivity because of its higher alkali index, while at temperature above 900 °C, conversion of OPS char was faster due to its higher porosity and larger surface area.

Keywords

CO_2 gasification; Palm shell char; Pistachio nut shell; Ash composition; Surface area.