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Co-gasification of Indian Rice Husk and Indian Coal with High-Ash in Bubbling Fluidized Bed Gasification Reactor

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Abstract

In this study, co-gasification of rice husk and coal in a lab-scale bubbling bed gasification reactor is reported. Blends of Indian coal with 36% ash and Indian rice husk with 22% ash are used considering proper particle sizes, air flow rates and steam flow rates. Air and steam are used as gasification agents. The reactor is operated at 40 kW (thermal), under atmospheric pressure. Blends are prepared on the basis of power share; rice husk percentage in the blend is varied to contribute to 0 to 90% of the total power. Results shows that when rice husk is added, all the performance metrics such as total carbon conversion, cold gas efficiency and calorific value of the synthetic gas, show increasing trend. When rice husk contributes from 50% to 75% of the total power, the total carbon conversion is around 89%, cold gas efficiency is around 78% and the calorific value of the synthetic gas is around 5.4 MJ/cubic-meter. Methane yield increases from a volumetric percentage of 1% with 0% rice husk to around 8.37% with 75% rice husk. In summary, a good performance is achieved and blending of rice husk and high ash coal is highly beneficial.

Keywords: Bubbling bed reactor; co-gasification; coal with high ash; carbon conversion; cold gas efficiency; rice husk

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