

Co-gasification characteristics of pine bark biomass and Bangladeshi bituminous coal using an entrained flow gasifier

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Abstract

Co-gasification of coal and renewable biomass is a promising technique to reduce greenhouse gas emission from coal gasification alone. The co-gasification performance of pine bark (PB) biomass and Bangladeshi bituminous coal (BBC) have been assessed using a high-temperature entrained flow gasifier under CO₂ atmosphere. Results show that increasing biomass concentration increases the carbon conversion, syngas quality and cold gas efficiency (CGE), while reduces emission. Using 20% CO₂ as the reactant gas, an addition of 20% biomass with coal increased the carbon conversion by 21.5, 10.6 and 4.5%-point at temperatures of 1000, 1200 and 1400 °C compared to that of coal respectively. Increasing biomass in the blend from 20% to 80% increased the yield of CO by 36%, 21% and 11% with increasing temperature, while the concentration of H₂ remained nearly constant. Also, the CGE, fragmentation index and alkali and alkaline earth minerals in ash were increased with increasing biomass ratio.

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