Co-gasification of empty fruit bunch in a downdraft reactor: A pilot scale approach

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A B S T R A C T

Biomass gasification shows great potential to displace fossil fuels. This paper states the steady state simulation for the gasification of palm oil empty fruit brunch (EFB) in pilot plant downdraft reactor and modelled using Aspen Plus®. The biomass was characterized to evaluate the degree of feedstock's structural order. The effect of reactor temperature and pressure on syngas production of downdraft gasification of EFB at the constant steam flow rate of 186.37 mol/h were investigated. The results revealed the concentration of hydrogen and CO increased from 12 to 17.5 mol% and 55–60.6 mol% respectively, but the CO_2 concentration decreased from 30 to 19.4 mol% with in-creasing temperature (875–975 °C) and pressure (25–35 bar). The results indicated that the product gas from co-gasification with charcoal has higher H_2 and CO concentrations in comparison with the EFB gasification. There-fore, co-gasification of the feedstock has a significant potential to overcome the problem of disrupted feedstock supply in gasification.

Keywords: Co-gasification, Downdraft reactor; EFB, Charcoal; Aspen plus