Modelling and optimisation of biomass fluidised bed gasifier.

Abstract

Recently, biomass for bioenergy and biofuel via gasification has become of great interest to energy and fuels production. Besides, gasification is recognised as a promising first processing step in an integrated biorefinery due to green and renewable technology. In this work, a stoichiometric equilibrium model of biomass fluidised bed gasifier is developed and followed by model improvement includes a correction factor to the equilibrium constants with a function of temperature. To illustrate the proposed model, bagasse is taken as the feedstock and gasification modelling based on the experiment result of a fluidised bed gasifier is presented. To ensure the accuracy of the model, predicted syngas compositions are validated with the experimental results. Besides, the proposed model is also reformulated for different types of biomass feedstock (e.g., rice husk, coconut shell, etc.). Based on the developed models, the operating condition of the gasifier can be optimised and the composition of the syngas can also be determined.