Quasi-equilibrium modeling of air-steam blown biomass gasification in dual fluidized-bed

임영일*, Son I. Ngo
한경대학교
(limyi@hknu.ac.kr*)

Gasification is one of the most promising technologies for converting biomass as a renewable source into an easily transportable and usable fuel. This study presents an air-steam blown biomass gasification (ASBG) thermodynamic equilibrium model to understand the effect of operating parameters on the syngas composition in a dual-circulating fluidized-bed (DFB). Steam participation (β) and kinetic carbon conversion (fC) functions are employed to consider the actual steam concentration and char reactivity, respectively, in the fluidized-bed. The predicted final gas composition is validated with the experiment data from the literature with the wide range of operating conditions. Using the ASBG model, parametric study on gasification temperature (T), biomass to fuel ratio (SBR), and equivalent ratio (ER) is then investigated to predict gas yield, lower heating value, solid circulation ratio, and heat efficiency.