

Steam Gasification Characteristics of Biomass in a Fluidized Bed Reactor

박동규, 구정희, 서명원, 김상돈*, 이시훈¹, 이재구¹
한국과학기술원; ¹한국에너지기술연구원
(kimsd@kaist.ac.kr*)

Biomass is known as an important renewable alternative energy resource. Sawdust was chosen as a resource of biomass, which is suitable for domestic power plants application. To investigate the biomass gasification characteristics and to produce the low calorific value gas in a small pilot scale fluidized bed gasifier (0.1 m I.D x 1.6 m high) at atmospheric pressure, sawdust has been gasified with air and steam. The effects of gas velocity ($2-5 U_{mf}$), reaction temperature ($750-900^{\circ}\text{C}$) and the gasification agents ratio of $\text{O}_2/\text{H}_2\text{O}$ (0.15-1.0) on gas composition, gas yield, cold gas efficiency, calorific value of the product gas and carbon conversion of sawdust have been determined. Carbon conversion (16-35%), gas yield ($0.62-0.87 \text{ m}^3/\text{kg-biomass}$), calorific value ($2.6-5.0 \text{ MJ/m}^3$) and cold gas efficiency (8.2-22.0%) of the product gas increase with increasing gas velocity and the reaction temperature. With increasing $\text{O}_2/\text{H}_2\text{O}$ ratio, carbon conversion (13.7-29.2%), gas yield ($0.4-1.1 \text{ m}^3/\text{kg-biomass}$) and cold gas efficiency (9.3-14.2%) of the product gas increase but calorific value ($5.2-2.6 \text{ MJ/m}^3$) of the product gas decreases due to the decreases of the combustible gas contents.