Performance indicators for air and air–steam auto-thermal updraft gasification of biomass in packed bed reactor

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Abstract

Auto-thermal updraft gasification of biomass pellets in a packed bed reactor was conducted by using air and air–steam mixture. Air–steam gasification produced syngas with slightly improved lower heating value of 4.5 MJ/m_N^3 in comparison to 4.4 MJ/m_N^3produced during air gasification. The corresponding tar generation for air gasification and air–steam gasification was 21.2 g/m_N^3 and 26.2 g/m_N^3, respectively. Cold gas efficiency for air gasification and air–steam gasification was realized to be 91% and 91.4%, respectively. Carbon conversion during air–steam gasification reached about 91.5% while carbon conversion during air gasification was limited to 84.3%.

Keywords: Biomass gasification; Updraft; Auto-thermal; Packed bed reactor