Topic: Removal of tar in biomass gasification process: a comparison of catalytic and non-catalytic tar cracking

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ABSTRACT

One of the major issues in biomass gasification technology is how to deal with the biomass tar. Catalytic and non-catalytic tar thermal cracking and tar steam reforming were studied by using naphthalene as a model tar compound. The experiments were conducted in a lab-scaled fixed bed reactor. Fe/Al_2O_3 and $Ni\text{-}Fe/Al_2O_3$ catalysts were prepared and used as the catalyst for tar decomposition. Results indicate that carbon conversion into gas of tar thermal cracking and tar steam reforming was increased obviously with an increase of reaction temperature from 600 to 800°C. The presence of Fe/Al_2O_3 catalyst gave a higher in carbon conversion into gas with the increasing of H_2 production than that case of without catalyst. In addition, the catalytic performance of Fe/Al_2O_3 catalyst in term of tar reduction became more significant in tar steam reforming than that in tar thermal cracking. When comparing with that of the Fe/Al_2O_3 catalyst, the $Ni\text{-}Fe/Al_2O_3$ catalyst was superior. The performance in tar steam reforming resulting in the increase of carbon conversion into gas. This was probably due to the presence of Ni-Fe bimetallic particles.

Keywords: Tar, Biomass gasification, reforming