

H₂-Rich and Tar-Free downstream gasification reaction of EFB by using the Malaysian dolomite as a secondary catalyst

ABSTRACT

In this study, Malaysian dolomites as secondary catalysts are placed at the downstream of the fluidized-bed gasifier. Three types of Malaysian dolomites with different elemental ratios of CaO-MgO content denoted as P1, P2, and P3 are investigated with EFB gasification reaction at different cracking temperatures (700–900 °C). The performance of the catalysts with a variation of catalyst to biomass weight ratio (C/B) (0.05 to 0.30 w/w) is evaluated. The findings showed that the total gas yield increased by 20%, hydrogen increased by 66%, along with an almost 99% reduction in tar content with P1 catalyst with the following reaction conditions: gasification temperature of 850 °C, equivalence ratio (ER) of 0.25, and cracking temperature of 900 °C. Malaysia dolomite could be a secondary catalyst to provide a better alternative, tar-free hydrogen-rich gas with the possibility of regeneration and re-use.

Keyword: Empty fruit bunch; Gasification; Dolomite; Hydrogen fuel; Tar cracking