Calcium oxide as potential catalyst for gasification of palm oil empty fruit bunch to produce syngas.

ABSTRACT

Gasification of dry palm oil empty fruit bunch (EFB), by using a temperature-programmed instrument was performed to determine the amount of synthesis gas produced. Dry and finely crushed EFB was pre-mixed with calcium oxide. Temperature-programmed gasification (TPG) was done at temperature from 50°C - 550°C and also from 50°C - 700°C using 5% oxygen in He. Both experiments were held for 1hr at the final temperature. The products were monitored using an online mass spectrometer. Major products detected from this reaction were H2, CO, CO2 and CH4. The effect of calcium oxide amount (CaO: EFB ratio) was also investigated. A very significant increase of H2 and CO was observed when nano-sized calcium oxide was used as catalyst compared to bulk one. Reaction at 700°C using nano-sized CaO reduces the production of carbon dioxide during gasification. The characteristics of the catalyst used were analyzed by using XRD and XPS show some significant changes from CaO to CaCO3.

Keyword: Gasification; Empty fruit bunch; Calcium oxide; Syngas.