

Preparation and Characterization of Malaysian Dolomites as a Tar Cracking Catalyst in Biomass Gasification Process

ABSTRACT

Three types of local Malaysian dolomites were characterized to investigate their suitability for use as tar-cracking catalysts in the biomass gasification process. The dolomites were calcined to examine the effect of the calcination process on dolomite's catalytic activity and properties. The modifications undergone by dolomites consequent to thermal treatment were investigated using various analytical methods. Thermogravimetric and differential thermal analyses indicated that the dolomites underwent two stages of decomposition during the calcination process. The X-ray diffraction and Fourier-transform infrared spectra analyses showed that thermal treatment of dolomite played a significant role in the disappearance of the $\text{CaMg}(\text{CO}_3)_2$ phase, producing the MgO-CaO form of dolomite. The scanning electron microscopy microphotographs of dolomite indicated that the morphological properties were profoundly affected by the calcination process, which led to the formation of a highly porous surface with small spherical particles. In addition, the calcination of dolomite led to the elimination of carbon dioxide and increases in the values of the specific surface area and average pore diameter, as indicated by surface area analysis. The results showed that calcined Malaysian dolomites have great potential to be applied as tar-cracking catalysts in the biomass gasification process based on their favorable physical properties.

Keyword: dolomite, characterization