

Pyrolysis and Combustion Kinetics of Palm Kernel Shell Using Thermogravimetric Analysis

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Abstract : The combustion and pyrolysis behavior of Palm Kernel Shell (PKS) were investigated in a thermogravimetric analyzer. A 10 mg sample of each biomass was heated from 30 °C to 800 °C at four heating rates (within 5, 10, 15 and 30 °C/min) in nitrogen and dry air flow of 20 ml/min instead of pyrolysis and combustion process respectively. During pyrolysis, thermal decomposition occurred on three different stages include dehydration, hemicellulose-cellulose and lignin decomposition on each temperature range. The TG/DTG curves showed the degradation behavior and the pyrolysis/combustion characteristics of the PKS samples which led to apply in thermogravimetric analysis. The kinetic factors including activation energy and pre-exponential factor were determined by the Coats-Redfern method. The obtained kinetic factors are used to simulate the thermal decomposition and compare with experimental data. Rising heating rate leads to shift the mass loss towards higher temperature.

Keywords : combustion, palm kernel shell, pyrolysis, thermogravimetric analyzer

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