THERMAL DEGRADATION AND KINETIC ANALYSIS ON STEMBARK BIOMASS OF *Melaleuca cajuputi* Powell (GELAM)

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ABSTRACT

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Melaleuca species (Pokok Gelam) are a potential sources of renewable energy, melaleuca bark can produce the porous carbon materials for hydrogen storage, which is clean energy solution for future transportation. In this research, stembark of *Melaleuca cajuputi* Powell ware washed with distilled water to remove any contaminant and dirt before dry it at room temperature. After drying, it was shredded into smaller size for process crushed and grinded into powdered form. In pyrolysis process, powdered stembark of *Melaleuca cajuputi* Powell were investigate in a non-isothermal thermogravimetric analyser (TGA) in order to determine the degradation behavior of powdered stembark. There are two stage present, which first stage due to the elimination of moisture content and small amount of volatile matter compound and second stage is the place where plant biomass (hemicellulos, cellulose and lignin) degrade. The main decomposition of samples occurred between 230 – 387 °C, at heating rate 10 °C/min, corresponds to the degradation of 63.47% of volatile matter. Weight loss of sample, was strongly affected by heating rates. It was found that an increasing in heating rates results in a shift of thermograms to higher temperature. Attenuated Total Reflectance-Fourier Transform Infrared (ATR-FTIR) was performed to determine the possible chemical functional groups present in stembark of *Melaleuca cajuputi* Powell. From the ATR-FTIR analysis, there were volatile components that found. such as CO, H_2O, O-H, and cyclic and CO_2. Results showed that stem bark of Melaleuca cajuput Powell can be characterized as high volatile matter and low ash components compared to other biomasses. The activation energy of Melaleuca cajuputi Powell, was calculated by using model free FLYNN-WALL-OZAWA (FWO) and Kissinger-Akahira-Sunose (KAS) methods and ranges value were 17.15 – 32.6 kJ/mol and 17.35 – 30.04 kJ/mol, respectively.

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