

Analysis on thermal degradation and chemical contents of bamboo gigantochloa brang

Abstract

The degradation and chemical contents of a tropical bamboo *Gigantochloa brang* were studied and analyzed. The fourier transform infrared (FTIR) spectroscopy and thermal gravimetric analysis (TGA) equipment were used in the analyzing. The studies revealed the presence of basic functional groups p in the bamboo consisting mainly of ester, carbonyl and hydroxyl. The chemicals present vary in compositions depending on the location and position on bamboo samples taken. The same set of activation energies (105, 127, 100, 236, and 46 kJ/mol, respectively) were applied to all of the bamboo samples. Low reactivity of lignin components and hemicellulose occurred due to the peculiarities in the bamboo chemical structure/composition. The extractive and the moisture content was not taken into consideration in the kinetic study since they consists of less than 10%. The mechanism of the decomposition reactions were taken as three-step reactions involving hemicellulose, cellulose, and lignin with activation energies and dynamics of the related volatile fractions. The activation energy carried out in this study provides better insight into the thermal decomposition process as it provide more information on critical energy needed to start a reaction. The decomposition activation energy range obtained in this study could help in understanding the thermal decomposition stability of bamboo fibers and its application in natural fiber reinforced polymer composite industry. The activation energy can be useful in evaluating other parameters of thermal kinetics.

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