Characterization of Pyrolysis Kinetics for the Use of Tropical Biomass as Renewable Energy Sources

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Abstract
Tropical biomass such as rice husks, sugar bagasse, coffee husks and sisal waste are among typical biomass wastes abundant in most of the tropical countries. However, despite their enormous potential as energy sources, they are hardly studied and their thermal characteristics are still not well known. The purpose of this work is to determine the thermochemical characteristics and pyrolysis behavior of these selected biomasses. Proximate, ultimate and heating value analyses were carried out on the samples. Results show that all biomass have a range of, volatile contents (50–80 % w/w), fixed carbon (10–20 % w/w), ash content (<3 % w/w), carbon (50–56 % dry basis) low nitrogen (0.7–1.3 % dry basis) and sulphur (<0.1 wt % dry basis) contents with heating value (HHV 14–18 MJ/kg). The biomasses were thermally degraded through thermogravimetry analysis and their characteristics such as devolatilisation profiles and kinetics parameters (activation energy *E*, and frequency factor*A*) were determined, in an inert atmosphere. It is found that the kinetic parameters obtained can predict not only global devolatilization of biomass pyrolysis but also can predict the pyrolysis pathway of cellulose in the target biomass.

Keywords
Tropical biomass Pyrolysis Kinetics