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Assessing the potential of biofuel (biochar) production from food wastes through thermal treatment

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ABSTRACT

This work primarily investigated the feasibility of generating high quality biochar from food wastes (FW) torrefaction. The thermal behavior of FW torrefaction was studied between 225 - 300°C for 1 and 3 h at a fixed heating rate of 15°C/min. Torrefaction upgraded the energy density, calorific value and carbon content of FW compared to the untreated feedstock. Mass loss constituted a good measure of the reactivity and ease of degradation of FW based on the cumulative effect of time and temperature. The fuel properties of torrefied FW approached those of coal whilst their high energy yields confirmed their use as potential coal substitutes in thermal conversion systems. Torrefaction at 275°C at both residence times were optimal while severe torrefaction at 300°C for 3 h was energetically inefficient. FTIR analysis and the increased HHV of bio-oil fractions revealed that bio-oil could be used to produce value-added chemicals and biofuels upon upgrading.

Keywords: Torrefaction, food waste, mass loss, energy yield, FTIR of bio-oil

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