

Torrefaction of food waste as potential biomass energy sources

Abstract

BACKGROUND: Torrefaction is a mild form of pyrolysis that takes place at temperature between 200 – 300°C, that aims to improve the properties of the treated biomass, producing high quality solid biofuels with lower moisture content and higher energy density. This thermal pre-treatment is commonly carried out in an inert environment, whereby the treated biomass may be stored for longer period, and is suitable to be applied for energy production processes such as combustion and gasification. The objective of this study is to investigate the improvement of chemical compositions and energy potential of torrefied FW in a fixed bed reactor. The torrefaction process was carried out in a fixed bed reactor with continuous flow of nitrogen, evaluating the effect of temperature (220°C to 260°C), residence time (15 to 60 minutes) and particle size (500 µm to more than 1 mm).

RESULTS: The mass yield and energy yield were decreased as the temperature and residence time increased. The carbon and higher heating value showed the increasing trend as the temperature, residence time and size distribution increased. For proximate analysis, the moisture content and volatile matter were decreased as the temperature and residence time increased. Meanwhile, the fixed carbon and ash were increased. All these results are consistent with previous works.

CONCLUSION: The temperature gave the biggest impact to characterization of torrefaction product. Residence time also affected but lesser than temperature. Meanwhile, the size distribution can be concluded that gave less extent impacts as the result was inconsistent for most all the analysis.