

Combining Wet Rendering with Torrefaction to Improve the Fuel Characteristics of Biochar from Food Waste

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Abstract:

Food waste is a potential source of renewable carbon that can be utilized as a feedstock for biofuel production. Instead of disposing it in the landfills, food waste can be processed through thermochemical process known as torrefaction, which is conducted between 200 ☐C and 500 ☐C under inert atmosphere, to produce energy-dense biochar. Due to high oil content in the food waste, wet rendering process is introduced as a pre-treatment step to remove the oil from food waste. In this study, the potential of food waste as a renewable energy source is studied, where the biochar produced from direct torrefaction (DT) is compared with the biochar produced from torrefaction process that is preceded with wet rendering (WR) process. Food waste was torrefied in the fixed bed reactor at temperatures 220 ☐C, 250 ☐C and 300 ☐C (15 min, 30 min and 45 min). The produced biochar were characterized in terms of its elemental composition, High Heating Value (HHV) and proximate analysis which includes moisture content, fixed carbon, ash content and volatile matter. It was found that the torrefied food waste shows improved physical properties when compared to raw food waste. The moisture content showed significant reduction while the fixed carbon increased with increasing torrefaction and residence time. This effects were further improved with WR, especially HHV which indicates that the WR process followed by torrefaction may be able to further improve the produced biochar.

Keywords - Torrefaction, Wet rendering, Food waste, Biochar, Biomass