Production of Bio-Fuel from Food Industry Wastes

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Biodegradable wastes such as food industry wastes could be converted to various forms of energy using appropriate technologies. The advantages of utilizing these wastes as an energy resource not only lead to revenue gains by recovering the energy and reducing waste disposal costs but also reducing the impact on the environment. Among thermochemical processes for conversion of wastes in high moisture content to energy, hydrothermal carbonization(HTC) is a promising route without a need for drying process.

In this study, HTC of food industry wastes, such as potato peels-PP, pomegranate pomace-PoP and grape pomace-GP, was studied to obtain coal like solid product (hydrochar). The effect of process conditions (temperature and duration) on the yield and fuel properties of hydrochar was investigated. HTC experiments were carried out between 200-250 °C at 15 % biomass concentration for 30-240 min. duration time. Fuel properties of hydrochars was determined according to ASTM standart analysis. In addition, to investigate potential of hydrochars as substitute fuels for co-combustion with coal, their combustion characteristics were determined using TGA.

It was found that the effect of temperature on the yield and fuel properties of hydrochars varies depending on time. The reaction time of 60 min were determined as optimum conditions in terms of yields of mass and energy. The mass yields of hydrochar produced for 60 min were 32-18%, 48-27% and 64-25% for PP, PoP and GP, respectively. On the other hand, the energy yields were found as 46-28%, 63-38% and 79-63% for PK, NP and UP, respectively. The H/C and O/C ratios of the hydrochar decreased with the increase in temperature, as a result, lignite coal-like hydrochars were obtained at severe HTC conditions. The slagging index values of hydrochars implied low slagging potential during combustion. On the other hand, HTC resulted in hydrochars with reduced fouling index implying medium fouling potential during their combustion due to the significant removal of alkali metals. It was found that hydrochars had lower ignition and burn out temperature than lignite. The combustion reactivity of hydrochar was much higher than that of lignite.

As conclusion, HTC appears a promising process for valorization of Food Wastes to provide benefits to energy sector as well as to protect environment.