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Investigation on the fast co-pyrolysis of sewage sludge with biomass and the combustion reactivity of residual char

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ABSTRACT

Gaining the valuable fuels from sewage sludge is a promising method. In this work, the fast pyrolysis characteristics of sewage sludge (SS), wheat straw (WS) and their mixtures in different proportions were carried out in a drop-tube reactor. The combustion reactivity of the residual char obtained was investigated in a thermogravimetric analyzer (TGA). Results indicate that SS and WS at different pyrolysis temperatures yielded different characteristic gas compositions and product distributions. The co-pyrolysis of SS with WS showed that there existed a synergistic effect in terms of higher gas and bio-oil yields and lower char yield, especially at the WS adding percentage of 80 wt.%. The addition of WS to SS increased the carbon content in the SS char and improved char porous structures, resulting in an improvement in the combustion reactivity of the SS char. The research results can be used to promote co-utilization of sewage sludge and biomass.

Keywords: Sewage sludge; Biomass; Fast pyrolysis; Synergistic effect; Char

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