Short Communication

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Effect of torrefaction pretreatment on the pyrolysis of rubber wood sawdust analyzed by Py-GC/MS

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Abstract

The aim of this study was to investigate the effect of torrefaction on the pyrolysis of rubber wood sawdust (RWS) using pyrolysis–gas chromatography/mass spectrometry (Py-GC/MS). Three typical torrefaction temperatures (200, 250, and 300 °C) and pyrolysis temperatures (450, 500, and 550 °C) were considered. The results suggested that only diethyl phthalate, belonging to esters, was detected at the torrefaction temperatures of 200 and 250 °C, revealing hemicellulose degradation. With the torrefaction temperature of 300 °C, esters, aldehydes, and phenols were detected, suggesting the predominant decomposition of hemicellulose and lignin. The double-shot pyrolysis indicated that the contents of oxy-compounds such as acids and aldehydes in pyrolysis bio-oil decreased with rising torrefaction temperature, implying that increasing torrefaction severity abated oxygen content in the bio-oil. With the torrefaction temperature of 300 °C, relatively more cellulose was retained in the biomass because the carbohydrate content in the pyrolysis bio-oil increased significantly.

Keywords: Torrefaction; Pyrolysis; Bio-oil; Py-GC/MS; Double-shot analysis.