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Pyrolysis of Palm Kernel Shell with Internal Recycling of Heavy Oil

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Abstract: This paper investigated pyrolysis of palm kernel shell in a proposed reactor, which is characterized by internal recycling of heavy oil between a heavy oil sorption zone and pyrolysis zone. The internal recycling of heavy oil favors conversion of heavy oil to char, gas, and light oil. Compared with the product distribution from the conventional pyrolysis without heavy oil recycling, the yields of char, gas, and GC/MS detectable organic compounds increase from 34.8, 15.2, and 9.8 wt%-(dry feedstock) to 38.5, 19.0, and 16.9 wt%-(dry feedstock), respectively, with the help of internal recycling of heavy oil. The increases in the char and gas yields are interestingly found to be nearly equivalent. Furthermore, the yields of acetic acid and phenol in the resulting bio-oil can be as high as 10.1 and 2.7 wt%-(dry feedstock), and the outputs of 2-methylfuran, 2,6-dimethoxyphenol, and H_2 are increased by around 37, 7, and 4 times, respectively.

Keywords: Pyrolysis; Palm kernel shell; Internal recycling; Heavy oil

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