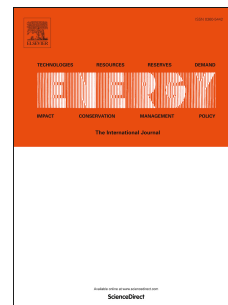


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Influence of waste tire addition on wheat straw pyrolysis yield and oil quality

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Abstract

This study investigates the effect of waste tire (WT) addition to wheat straw (WS) pyrolysis feedstock on consequent liquid yield quality and quantity. Samples of WS, WT and different blend ratios of the two wastes were fed to a fixed bed reactor. Reactor temperature was increased at 20°C/min up to 500°C as suggested by the thermogravimetric analysis of the feedstocks. Nitrogen was used as sweeping gas. Among the blends, WS/WT 2:3 produced maximum liquid yield. The organic phases of pyrolysis oil of WS and WT along with co-pyrolysis (WS/WT 2:3) oil were further analyzed by GC-MS, FTIR, elemental analyzer and calorimeter as well as other analytical instruments for respective physico-chemical properties. Addition of WT increased the calorific value (from 23.3 to 40.7 MJ/kg), carbon (58 to 85%) and hydrogen (8.6 to 9.6%) content and decreased oxygen content (from 32.8 to 5.1%) of the co-pyrolysis oil as compared to that of WS. Co-pyrolysis oil was also found to be more stable with significantly lesser quantity of aldehydes. Addition of WT to WS pyrolysis feedstock decreased the further fuel processing requirements to convert liquid yield into usable fuel, proving the co-pyrolysis as preferable option for the management of the two waste types.

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