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Conversion of poplar into bio-oil via subcritical hydrothermal

liquefaction: structure and antioxidant capacity

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ABSTRACT

Subcritical hydrothermal liquefaction of poplar was performed at 220-280 °C, and the liquid phase produced was extracted by ethyl acetate to obtain light oil (LO), which contained LO1 (water-soluble) and LO2 (ethyl acetate-soluble). The residue was further extracted with acetone to produce heavy oil (HO) and solid residue (SR). The highest bio-oil yield of 19.88% was obtained at 260 °C. The HO produced at 260 °C had the highest content of C (69.13%) and the higher heating value was 27.97 MJ/kg. The O/C and H/C ratios of LO were higher than those of HO due to less aromatics in LO. Oxidative inhibition rates of bio-oils, measured in DPPH-ethanol solution at a concentration of 0.1 mg/mL, reached 60.76% for LO1 while 90.29% and 90.85% for LO2 and HO, respectively. The bio-oil with good antioxidant activity can be utilized as an additive in bio-diesel to improve oxidation stability.

Keywords: Hydrothermal liquefaction; Poplar; Bio-oil; Antioxidant capacity

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