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Rawel Singh, Bhavya Balagurumurthy, Aditya Prakash, Thallada Bhaskar

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Rawel Singh, Bhavya Balagurumurthy, Aditya Prakash, Thallada

Bhaskar*

Bio-Fuels Division (BFD), CSIR-Indian Institute of Petroleum (IIP), Dehradun

248005, India

*corresponding author: tbhaskar@iip.res.in; thalladab@yahoo.com

Abstract

Thermal and catalytic hydrothermal liquefaction of water hyacinth was performed at temperatures from 250-300 °C under various water hyacinth:H₂O ratio of 1:3, 1:6 and 1:12. Reactions were also carried out under various residence times (15-60) mins as well as catalytic conditions (KOH and K₂CO₃). The use of alkaline catalysts significantly increased the bio-oil yield. Maximum bio-oil yield (23 %) comprising of bio-oil1 and bio-oil2 as well as conversion (89 %) were observed with 1N KOH solution. ¹H NMR and ¹³C NMR data showed that both bio-oil1 and bio-oil2 have high aliphatic carbon content. FTIR of bio-residue indicated that the usage of alkaline catalyst resulted in bio-residue samples with lesser oxygen functionality indicating that catalyst has a marked effect on nature of the bio-residue and helps to decompose biomass to a greater extent compared to thermal case.

Key words: water hyacinth, biomass, aquatic biomass, hydrothermal liquefaction, subcritical water

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