VISVESWARAYA TECHNOLOGICAL UNIVERSITY

BELGAUM- 590 010

PROJECT REPORT

"Slow Pyrolysis of Kikar for Generation of Solid Liquid and Gaseous Fuels"

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ABSTRACT

The pyrolysis of *Acasia nilotica sub sp. indica* (kikar) wood was investigated to produce bio-oil in a fixed bed pyrolysis reactor. The effect of process parameters such as pyrolysis temperature (450-700 °C), particle size (0.25-1.7 mm) and sweep gas (nitrogen) velocity (0.05-0.4 $cm^3 min^{-1}$) on the pyrolysis product yields and their chemical compositions were investigated. The maximum oil yield of ca 38% was obtained at 600 °C pyrolysis temperature using the wood of particle size in the range of +0.425–0.60 mm at static atmosphere at a heating rate of 10 K min^{-1}. A slight increase in the oil yield was found with nitrogen flow rate increasing from 100 to 200 cm^3 min^{-1}. The chemical characterization of the products (oil, char and gas) was carried out. The bio-oil was characterized using elemental (CHNO) analysis, Fourier transform infrared (FT-IR) spectroscopy and gas chromatography/mass spectrometry (GC-MS) and ^1H NMR analysis. The char was characterized by proximate analysis, elemental composition, FT-IR spectroscopy and scanning electron microscopy (SEM). The H/C and O/C ratios of the chars decreased with the rise in the temperature. The gases were identified as CO_2, CO, Hydrogen and C_1-C_4 hydrocarbons.

Keywords: *Acasia nilotica*; kikar wood; pyrolysis; bio-oil; char; gas