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Physico-Chemical Characteristics of the Products Derived from the Thermolysis of Waste *Abies alba Mill*. Wood

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ABSTRACT

This paper reports the physico-chemical characteristics of the products derived from the thermolysis (thermolytic distillation) of waste silver fir (*Abies alba Mill.*) wood at different temperatures (400℃- 600℃) in a pilot scale plant. Depending on the thermolysis temperature, the procedure yielded 45 - 53 wt% pyroligneous acid with a high water content (80 - 86 wt%) and pH ≈ 3.6. The process also produced a carbonaceous solid or biochar (23 - 26 wt%), its properties strongly dependent on the thermolysis temperature. Gases (20 - 31 wt%) were also produced; these were transformed into electrical energy via a gas turbine. The pyroligneous acid was centrifuged to isolate a subfraction composed mostly of phenols (phenol, mequinol and furfural) with a total C content of 68 - 74 wt%. The remainder was subjected to fractionated distillation at laboratory scale, and the distillate subjected to liquid-liquid extraction using diethyl ether in two stages to obtain a bio-oil composed mainly of acetic acid (≈47%), aldehydes, ketones and alcohols (≈31%), phe- nols (≈18%) and aliphatic alcohols. The characteristics of the bio-oil depended on the thermolysis temperature.

KEYWORDS

Thrermolysis; *Abies alba Mill.*; Bio-Oil; Biochar

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