Stabilization of Empty Fruit Bunch derived Bio-oil using Solvents

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ABSTRACT

The intention of this research was to select the ideal condition for accelerated aging of bio-oil and the consequences of additive in stabilizing the bio-oil. The bio-oil was produced from the catalytic pyrolysis of empty fruit bunch. The optimum reaction conditions applied to obtain the utmost bio-oil yield were 5 wt% of H-Y catalyst at reaction temperature of 500 °C and nitrogen flow rate of 100 ml/min. A 10 wt% of solvents including acetone, ethanol, and ethyl acetate were used to study the bio-oil's stability. All the test samples were subjected to accelerated aging at temperature of 80 °C for 7 days. The properties of samples used as the indicator of aging were viscosity and water content. The effectiveness of solvents increased in the following order: acetone, ethyl acetate, and 95 vol% ethanol. Based on the result of Gas Chromatography-Mass Spectrometry (GC-MS), it could impede the chain of polymerization by converting the active units in the oligomer chain to inactive units. The solvent reacted to form low molecular weight products which resulted in lower viscosity and lessen the water content in bio-oil. Addition of 95 vol% ethanol also inhibited phase separation.

KEYWORDS

Stabilization, Empty fruit bunch, Catalytic pyrolysis, Accelerated aging, Solvents, Gas Chromatography-Mass Spectrometry (GC-MS).

INTRODUCTION

Lignocellulosic biomass has been used for the production of renewable fuels and chemicals. This has caused increasing attention due to shortage of oil reserves, enhanced fuel demand worldwide, increased climate concerns, and the inherent conflict between

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