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Torrefaction of Sorghum Biomass to Improve Fuel Properties

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Abstract

Torrefaction of energy sorghum and sweet sorghum bagasse was investigated at three different temperatures (250, 275 & 300 °C) for 30 min to determine product yields and its compositions. The torrefied solid yield ranged from 43 to 65% for sweet sorghum bagasse and 51 to 70% for energy sorghum. The energy density of both torrefied sorghums increased between 1.6 and 1.4 folds. Besides water, the acetic acid, with a maximum yield of 101.90 g/L was the dominant compound in the aqueous fraction of liquid products. The aqueous fraction from sweet sorghum bagasse contained furfural and furan carboxyl aldehydes, while ketones and alcohols were dominant from energy sorghum as other key compounds. Phenolic type chemicals and furan derivatives were the major compounds in the oil fraction of the liquid product, accounted up to 58 wt %. The condensable liquid products can be further upgraded into high-value platform chemicals.

Keywords: torrefaction, sorghum biomass, energy yield, torrefied liquid products, compositional analysis

1. Introduction

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