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4th International Renewable Energy Congress (IREC), 20-22 December 2012, Hammamet, Tunisia

Guest Editors: Abdeslam-Hassen Meniai and Djamila Rekioua

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Hydrothermal gasification of pure and crude glycerol in supercritical water: A comparative study

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ABSTRACT

A comparative gasification study between pure glycerol and two different kinds of crude glycerol is conducted in supercritical water under various operating parameters to investigate the effect of different compositions in crude glycerol on the gasification behaviors. Among various types of impurities in the crude glycerol, fatty acid methyl esters (FAMEs) exhibit a negative effect on the gas yield and gasification efficiency of crude glycerol in a batch apparatus due to the enhanced tar/char formation. At 650 °C and 5 wt%, gasification in a continuous apparatus exhibits H_2 yields of 26.44 and 35.85 mmol/g feed in 1 min for both types of crude glycerol, which could not be achieved by the batch system even with the reaction time extended up to 120 min. A shorter duration in the non-supercritical state may be the dominant parameter that leads to complete conversion of FAMEs and total gasification of crude glycerol using the continuous system.

1. Introduction

The huge amount of crude glycerol generated currently makes biodiesel production plants unattractive from an economic point of view, because of the chemical complexity of crude glycerol due to the presence of a large variety of impurities, such as water, soap, traces of methanol, unseparated fatty acid methyl esters (FAMEs), and many other inorganic

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