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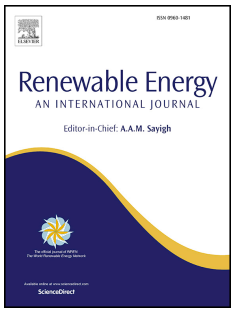


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# Comparison of slow and fast pyrolysis for converting biomass into fuel

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## Abstract

In this work, the conversion of sugarcane bagasse into fuel was studied as a low cost source material. The conversion was carried out experimentally in a batch pyrolysis reactor. Two pyrolysis methods were compared; namely, fast pyrolysis and slow or conventional pyrolysis. This comparison was based on the thermal decomposition of biomass into fuel and on the product yields. Since the yields are affected by the type of pyrolysis and the operating temperature of the reactor, the comparisons have been conducted at three fixed temperature values of 753, 853 and 953 K. The results revealed that the conventional pyrolysis produce more syngas yield with the increases of temperature. In the case of fast pyrolysis, it was observed that losses and solid yield increase with temperature increase. Moreover, it was found that the highest losses in both cases are less than 15% and that it was higher in conventional pyrolysis. Gases released during the thermal decomposition of biomass were identified as $H_2$, CO, $CO_2$, $CH_4$ and some light molecular weight of hydrocarbons, such as $C_2H_4$ and $C_2H_6$. The low temperature was favored for the production of methane other than hydrogen for both processes, while high temperature was favored for the production of hydrogen. The produced $H_2$ can be used in typical fuel cells.

**Keywords:** Slow pyrolysis, Fast pyrolysis, Biomass pyrolysis, Sugarcane bagasse and agricultural waste.

## 1. Introduction

Nowadays, sugarcane bagasse is attracting an increased attention as it is a highly available material in the sugar industries and it has low cost. Consequently, this fibrous residue is considered as a raw material for biofuel [1-3]. Nevertheless, the majority of it can be combusted onsite for supply of energy; specifically for steam generation [4]. The use of biomass as a renewable energy source is very interesting because it offers a significant improvement towards being friendly with the environment. In fact, the use of biomass converting technology provides a solution to the pollution problem and creates new filed of jobs in the domain of innovative developments in agricultural waste utilization. Biomass conversion provides additional advantages, such as reducing the volume of biomass and making it more compacted which eases