Fast continuous pyrolysis of biomass for bioOil and charcoal

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This paper describes a Fast Continuous Pyrolysis of Biomass Process that is being improved in a University of Campinas Plant Pilot, rated at a capacity around of 100 kgh^{-1} of biomass. The process utilizes a deep bubbling fluidized bed technology and Bio-Oil and Charcoal recovery system [1]. The feedstock's used for these studies were elephant grass and sugarcane bagasse, which were dried up to equilibrium moisture content (more less 10% humid basis). The Figure 1 show a photo of the rapid pyrolysis plant.

Figure 1. Photo of the rapid pyrolysis plant

A CSFB Simulator [2] is used to obtain several results computer, which include: concentration and mass flow profiles of gas components, concentration, mass flow and particle size distribution profiles of solids species throughout the bed, composition of the exit streams, entrainment and elutriation parameters and others details, to each experimental test condition.

On the other hand, a could flow models is used to examine the fluid dynamic behavior of bed inert, charcoal and feedstock's into a range of fluidization regimes.

High yields of charcoal (maximum between 15 and 20% dry basis for this technology) are produced from low gas superficial velocity (proximate at the minimum fluidization velocity of $0{,}1ms^{-1}$) and pyrolysis temperature around to $500^{o}C$. The ash content of the charcoal change with the type of biomass. Biomass with the elevated fine fraction and ash content produce further ash content of the charcoal.

The charcoal is to being physical and chemically characterized in order to their application as a fuel and adsorbent agent (with high adsorption capacity).

The experimental conditions and characteristics of the pyrolysis liquid (Bio-Oil) obtained from biomass are presented. The water content of the liquid is high because the system used in to Bio-Oil recovery (scrubber gases).

References

[1] Olivares GO, Cortez L, Seye O, Mesa JMP, Rosillo-Calle F. Theoretical and Experimental Study of Fast Pyrolysis of Sugarcane Bagasse Using a Pilot Fluidized Bed Reactor. Paper presented at the 1st World Conference and Exhibition on Biomass for Energy and Industry, Conference and Exhibition Center, Sevilla, Spain, 5-9 June 2000, p.100.

[2] CSFB (Version 3.0) – Comprehensive Simulator for the Fluidized Bed, Technologix Corporation, Lisle, IL, USA, February 2001.