Accepted Manuscript

Influence of biomass pretreatment on upgrading of bio-oil: comparison of dry and hydrothermal torrefaction

Xu Xiwei, Tu Ren, Sun Yan, Li Zhiyu, Jiang Enchen

PII: S0960-8524(18)30550-9
DOI: https://doi.org/10.1016/j.biortech.2018.04.037
Reference: BITE 19817

To appear in: *Bioresource Technology*

Received Date: 14 February 2018
Revised Date: 7 April 2018
Accepted Date: 9 April 2018

Please cite this article as: Xiwei, X., Ren, T., Yan, S., Zhiyu, L., Enchen, J., Influence of biomass pretreatment on upgrading of bio-oil: comparison of dry and hydrothermal torrefaction, *Bioresource Technology* (2018), doi: https://doi.org/10.1016/j.biortech.2018.04.037

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Corresponding author: Jiang Enchen

Email: jiangenchen200801@hotmail.com

Influence of biomass pretreatment on upgrading of bio-oil: comparison of dry and hydrothermal torrefaction

Xu Xiwei, Tu Ren, Sun Yan, Li Zhiyu, Jiang Enchen*

College of Materials and Energy in South China Agricultural University, Guangzhou 510640

Abstract: The dry and hydrothermal torrefacation of on Camellia Shell (CS) was carried on three different devices- batch autoclave, quartz tube, and auger reactor. The torrefied bio-char products were investigated via TGA, elemental analysis and industrial analysis. Moreover, the pyrolysis and catalytic pyrolysis properties of torrefied bio-char were investigated. The results showed torrefaction significantly influenced the content of hemicellulose in CS. And hydrothermal torrefaction via batch autoclave and dry torrefaction via auger reactors promoted the hemicellulose to strip from the CS. Quartz tube and auger reactor were beneficial for devolatilization and improving heat value of torrefied bio-char. The result showed that the main products were phenols and acids. And hydrothermal torrefction pretreatment effectively reduced the acids content from 34.5% to 13.2% and enriched the content of phenols (from 27.23% to 60.05%) in bio-oil due to the decreasing of hemicellulos in torrefied bio-char. And the catalyst had slight influence on the bio-oil distribution.

Keywords: hydrothermal and dry torrefaction; properties of torrefied bio-char; pyrolysis; upgrading of bio-oil; phenols.

1 Introduction

Biomass dry/hydrothermal torrefaction was a mild thermochemical pre-treatment method where biomass was heated to 180-300 °C to remove most of the hemicellulose and a bit of cellulose and lignin (Tran et al., 2013; Tapasvi et al., 2015). Dry torrefaction was widely discussed because it was beneficial for overcoming the drawbacks of biomass such as low bulk density, high oxygen content, low heat value, high moisture and volatile matter, etc.(Bilgic et al., 2016; Chen et al., 2017; Xu et al., 2017). Hydrothermal torrefaction is a promising method for dealing with wet organic matter such as agricultural and forestry residuals, animal manure and human waste.

Moreover, the bio-oil from biomass pyrolysis was unstable and low value for industrial usage due to the high oxygen content. It is well know that torrefaction decreases the oxygen content of the solid product (Ibrahim et al., 2013; Atienza-Martínez et al., 2015), and is beneficial for the deoxygenation of

Download English Version:

https://daneshyari.com/en/article/7066928

Download Persian Version:

https://daneshyari.com/article/7066928

Daneshyari.com