



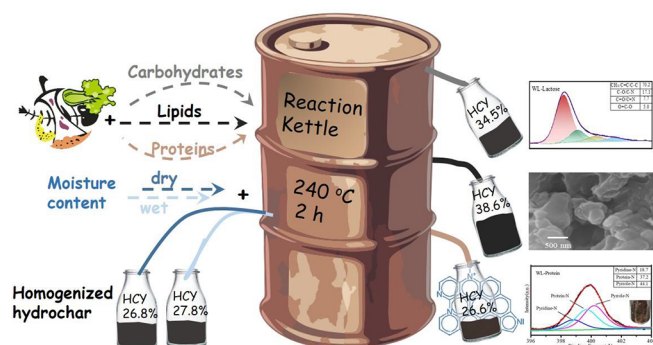
Correlations between the physicochemical properties of hydrochar and specific components of waste lettuce: Influence of moisture, carbohydrates, proteins and lipids

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GRAPHICAL ABSTRACT



ARTICLE INFO

Keywords:

Waste lettuce
Hydrothermal carbonization
Moisture content
Feedstock constitution
Hydrochar

ABSTRACT

This study aims to figure out the influence of moisture content and chemical constitution, i.e. carbohydrates, proteins and lipids, of waste lettuce on the physicochemical structure of hydrochar produced via hydrothermal carbonization. The experimental results showed that homogenized carbon material can be obtained by hydrothermal treatment, regardless of the moisture content of feedstock. During the hydrothermal carbonization process of waste lettuce, carbohydrates were the most active reactants contributing to hydrochar formation. Meanwhile, Maillard reaction between proteins and carbohydrates occurred, which promoted the aromatization of the organic intermediates and increased the relative content of nitrogenous heterocyclic functional groups on the surface of hydrochar from 10.7 to 18.7%. Different from these two constitution, lipids did not participate in the carbonization reaction, the main hydrolyzates of lipids were adsorbed to the surface of hydrochar, leading to an increase in the mass of solid products.

1. Introduction

Food waste represents a largely underutilized organic fraction of municipal solid waste (MSW), accounting for about 40–60% of the total

MSW in China (Li et al., 2013; Zhou et al., 2018). The disadvantages of high and variable moisture during storage and transportation restrict the direct utilization of food waste. In view of this situation, hydrothermal carbonization (HTC) as a novel, low-cost, environmentally

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<https://doi.org/10.1016/j.biortech.2018.10.066>

Received 10 September 2018; Received in revised form 22 October 2018; Accepted 23 October 2018

Available online 26 October 2018

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