Accepted Manuscript

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PII: S0960-8524(18)30297-9
DOI: https://doi.org/10.1016/j.biortech.2018.02.100
Reference: BITE 19610

To appear in: *Bioresource Technology*

Received Date: 22 December 2017
Revised Date: 21 February 2018
Accepted Date: 22 February 2018

Please cite this article as: Cheng, F., Cui, Z., Mallick, K., Nirmalakhandan, N., Brewer, C.E., Hydrothermal Liquefaction of High- and Low-Lipid Algae: Mass and Energy Balances, *Bioresource Technology* (2018), doi: https://doi.org/10.1016/j.biortech.2018.02.100

Hydrothermal Liquefaction of High- and Low-Lipid Algae: Mass and Energy Balances

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Abstract

Hydrothermal liquefaction (HTL) of high-lipid microalgae *Nannochloropsis salina* (*N. salina*) and low-lipid microalgae *Galdieria sulphuraria* (*G. sulphuraria*) were run under subcritical conditions (310-350 °C and 10-17 MPa) in a 1.8 L batch autoclave system. HTL mass and energy balances for both species were compared under different operating conditions to predict the optimum reaction conditions for new algae strains based on their feedstock composition. Bio-crude oils and chars were characterized by bomb calorimetry, elemental analysis, inductively coupled plasma optical emission spectrometry (ICP-OES), and thermogravimetric analysis (TGA). Under the optimized conditions, 59 wt.% and 31 wt.% bio-crude oil yields were obtained from HTL of *N. salina* and *G. sulphuraria*, respectively. Meanwhile, 85% and 59% of the