Accepted Manuscript

Computational Fluid Dynamics Simulation of Hydrothermal Liquefaction of Microalgae in a Continuous Plug-Flow Reactor

Panneerselvam Ranganathan, Sivaraman Savithri

PII: S0960-8524(18)30273-6
DOI: https://doi.org/10.1016/j.biortech.2018.02.076
Reference: BITE 19586

To appear in: *Bioresource Technology*

Received Date: 13 November 2017
Revised Date: 14 February 2018
Accepted Date: 16 February 2018

Please cite this article as: Ranganathan, P., Savithri, S., Computational Fluid Dynamics Simulation of Hydrothermal Liquefaction of Microalgae in a Continuous Plug-Flow Reactor, *Bioresource Technology* (2018), doi: https://doi.org/10.1016/j.biortech.2018.02.076

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

Computational Fluid Dynamics Simulation of Hydrothermal Liquefaction of Microalgae in a Continuous Plug-Flow Reactor

Panneerselvam Ranganathan*, and Sivaraman Savithri

Environmental Technology Division, CSIR–National Institute for Interdisciplinary Science and Technology (CSIR-NIIST), Trivandrum–695019, India.

Abstract

Computational Fluid Dynamics (CFD) technique is used in this work to simulate the hydrothermal liquefaction of *Nannochloropsis* sp. microalgae in a lab-scale continuous plug-flow reactor to understand the fluid dynamics, heat transfer, and reaction kinetics in a HTL reactor under hydrothermal condition. The temperature profile in the reactor and the yield of HTL products from the present simulation are obtained and they are validated with the experimental data available in the literature. Furthermore, the parametric study is carried out to study the effect of slurry flow rate, reactor temperature, and external heat transfer coefficient on the yield of products. Though the model predictions are satisfactory in comparison with the experimental results, it still needs to be improved for better prediction of the product yields. This improved model will be considered as a baseline for design and scale-up of large-scale HTL reactor.

Keywords: microalgae; biofuels; hydrothermal liquefaction; plug-flow reactor; CFD

*Corresponding author. Email address: pranganathan@niist.res.in

Download English Version:

https://daneshyari.com/en/article/7067647

Download Persian Version:

https://daneshyari.com/article/7067647

Daneshyari.com