

Accepted Manuscript

Brewers' spent grains: Drying kinetics and biodiesel production

Elliot Mallen, Vesna Najdanovic-Visak



PII: S2589-014X(18)30005-7

DOI: <https://doi.org/10.1016/j.biteb.2018.01.005>

Reference: BITEB 6

To appear in:

Received date: 3 January 2018

Revised date: 21 January 2018

Accepted date: 22 January 2018

Please cite this article as: Elliot Mallen, Vesna Najdanovic-Visak , Brewers' spent grains: Drying kinetics and biodiesel production. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Biteb(2017), <https://doi.org/10.1016/j.biteb.2018.01.005>

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.

Brewers' Spent Grains: Drying Kinetics and Biodiesel Production

Elliot Mallen and Vesna Najdanovic-Visak*

Engineering Department, Faculty of Science and Technology, Lancaster University, United Kingdom

*corresponding author: Engineering Building, Lancaster University, Gillow Avenue, Lancaster LA1 4YW, United Kingdom; Tel: +44 (0)1524 593 586; email: v.najdanovic@lancaster.ac.uk

Abstract

Enormous amounts of brewers' spent grains (BSGs) per year are generated to produce beer worldwide. BSGs can be used as a carbon source, biofuel to generate energy and as a source of biogas. Typically, BSGs contain more than 60 mass% of water and, therefore, drying kinetics is a paramount for the development of any of these valorisation processes.

In this work, we reveal the main parameters and mechanism of drying kinetics of BSGs at isothermal conditions (60°C-90°C), measured by thermogravimetric analysis. Diffusion coefficients ranged from $1.42 \times 10^{-9} \text{ m}^2 \text{ s}^{-1}$ to $2.67 \times 10^{-9} \text{ m}^2 \text{ s}^{-1}$ while the activation energy was 26.6 kJ mol^{-1} .

Furthermore, for the first time, biodiesel production from BSGs is reported. We employed acid catalysed in situ transesterification process, at different catalyst concentrations, methanol to BSGs ratios, reaction time and temperature.

The outcomes of our study show promise for alternative valorisation of brewers' spent grains, an abundant waste spread around the world.

Keywords: Thermogravimetric analysis (TGA); In situ transesterification; Drying mechanisms; Reactive extraction.

Download English Version:

<https://daneshyari.com/en/article/6482566>

Download Persian Version:

<https://daneshyari.com/article/6482566>

[Daneshyari.com](https://daneshyari.com)