

Accepted Manuscript

Bio-combustion of petroleum coke: The process integration with photobioreactors

Ihana A. Severo, Mariany C. Deprá, Juliano S. Barin, Roger Wagner, Cristiano R. de Menezes, Leila Q. Zepka, Eduardo Jacob-Lopes

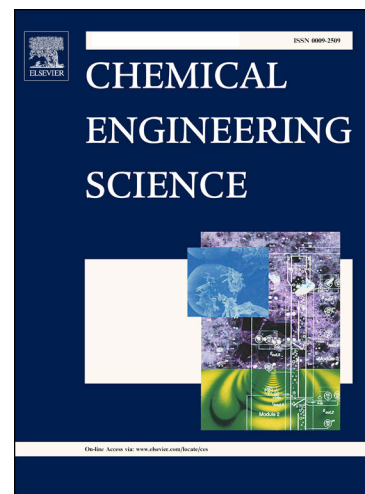
PII: S0009-2509(17)30737-6
DOI: <https://doi.org/10.1016/j.ces.2017.12.001>
Reference: CES 13935

To appear in: *Chemical Engineering Science*

Received Date: 26 June 2017
Revised Date: 17 November 2017
Accepted Date: 1 December 2017

Please cite this article as: I.A. Severo, M.C. Deprá, J.S. Barin, R. Wagner, C.R. de Menezes, L.Q. Zepka, E. Jacob-Lopes, Bio-combustion of petroleum coke: The process integration with photobioreactors, *Chemical Engineering Science* (2017), doi: <https://doi.org/10.1016/j.ces.2017.12.001>

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.



Bio-combustion of petroleum coke: The process integration with photobioreactors

Ihana A. Severo, Mariany C. Deprá, Juliano S. Barin, Roger Wagner, Cristiano R. de Menezes, Leila Q. Zepka and Eduardo Jacob-Lopes*

Department of Food Science and Technology, Federal University of Santa Maria (UFSM), Roraima Avenue, 1000, 97105-900, Santa Maria, RS, Brazil, Tel. +55 55 32208822.

Abstract: The objective of this study is to develop a bio-combustion system integrated into a photobioreactor. Different oxidizers (a simulated industrial gas stream containing 5.5% O₂, 18% CO₂ and 76.5% N₂, the atmospheric air and the photobioreactor exhaust gases in different residence times) were injected into the combustion chamber, and combustion temperature, combustion stability, heating rate, and fuel conversion were analyzed. The results have shown that the use of photobioreactor exhaust gases as oxidizer, biofuel, and nitrogen diluent in the combustion furnace, have increased the thermal efficiency of the system, with heating rates 30.5% and 45.8% higher than the atmospheric air and the simulated industrial gas stream, respectively. Thus, the integration of these processes could be considered a viable strategy to improve the combustion systems thermal performance, efficiently contributing to the sustainability and economy of industrial operations.

Keywords: biological carbon capture and utilization, combustion, microalgae, carbon dioxide, greenhouse gas.

1. Introduction

The continued growth in anthropogenic emissions of air pollutants, from burning fossil fuels, has become an issue of concern due to their adverse effects on the environment, particularly related to the carbon dioxide (CO₂), a

Download English Version:

<https://daneshyari.com/en/article/6588733>

Download Persian Version:

<https://daneshyari.com/article/6588733>

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