

Accepted Manuscript

Study of butyraldehyde degradation and by-products formation by using a surface plasma discharge in pilot scale: Process modeling and simulation of relative humidity effect

Guilherme Costa, Aymen Amine Assadi, Sara Gharib-Abou Ghaida, Abdelkrim Bouzaza, Dominique Wolbert

PII: S1385-8947(16)31045-2
DOI: <http://dx.doi.org/10.1016/j.cej.2016.07.099>
Reference: CEJ 15548

To appear in: *Chemical Engineering Journal*

Received Date: 18 April 2016
Revised Date: 8 July 2016
Accepted Date: 26 July 2016

Please cite this article as: G. Costa, A.A. Assadi, S. Gharib-Abou Ghaida, A. Bouzaza, D. Wolbert, Study of butyraldehyde degradation and by-products formation by using a surface plasma discharge in pilot scale: Process modeling and simulation of relative humidity effect, *Chemical Engineering Journal* (2016), doi: <http://dx.doi.org/10.1016/j.cej.2016.07.099>

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.



**Study of butyraldehyde degradation and by-products formation by
using a surface plasma discharge in pilot scale: Process modeling and
simulation of relative humidity effect**

COSTA Guilherme, ASSADI Aymen Amine*, GHARIB-ABOU GHaida Sara, BOUZAZA

Abdelkrim, WOLBERT Dominique

Laboratoire Sciences Chimiques de Rennes - Equipe Chimie et Ingénierie des Procédés, UMR

6226 CNRS, ENSCR-11, allée de Beaulieu, CS 508307-35708 Rennes, France.

E-mail address: aymen.assadi@ensc-rennes.fr (A. ASSADI).

Abstract

The purpose of this paper is to study the butyraldehyde (Buty) conversion using dielectric barrier discharge (DBD) in a continuous reactor at pilot scale. One of the focused-on parameters in this study is relative humidity, which effect on (i) butyraldehyde removal (ii) selectivity of CO₂ and CO, and (iii) intermediate byproducts and ozone formation was investigated using a DBD reactor with planar configuration. The results showed that at pilot scale, adding a small amount of water vapor in air enhances the processes performance and 10 % increase in Buty removal efficiency was observed.

A kinetic degradation model was also proposed, which takes into account the relative humidity influence. Active species due to water dissociation are integrated in the model. To represent the chemical degradation pathway, we supposed, in a first step, that an equivalent intermediate compound (EI) is formed directly from Buty. Then, in a second step, this EI is oxidized by active species into CO₂ and CO in the discharge zone. This

Download English Version:

<https://daneshyari.com/en/article/4763501>

Download Persian Version:

<https://daneshyari.com/article/4763501>

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