

Accepted Manuscript

Volume-of-Fluid Simulations of Gas-Liquid-Liquid Flows in Minichannels

V.M. Rajesh, Vivek V Buwa

PII: S1385-8947(18)30065-2
DOI: <https://doi.org/10.1016/j.cej.2018.01.050>
Reference: CEJ 18370

To appear in: *Chemical Engineering Journal*



Please cite this article as: V.M. Rajesh, V.V. Buwa, Volume-of-Fluid Simulations of Gas-Liquid-Liquid Flows in Minichannels, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.01.050>

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.

Volume-of-Fluid Simulations of Gas-Liquid-Liquid Flows in Minichannels

V. M. Rajesh¹ and Vivek V Buwa^{1,a}

¹*Department of Chemical Engineering, Shiv Nadar University, Gautam Buddha Nagar, Uttar Pradesh - 201314, India*

^{1,a}*Department of Chemical Engineering, Indian Institute of Technology Delhi, New Delhi - 110016, India*

Abstract

Three-phase segmented gas-liquid-liquid (G/L/L) flows in minichannels are important to several chemical process applications involving gas-liquid-liquid reactions. In the present work, we have investigated segmented G/L/L flows in a double T-junction minichannel, with cross-section of 0.95 mm x 1 mm, through high-speed imaging experiments and Volume-of-Fluids (VOF) simulations. The dynamics of bubble/slug formation at the 1st T-junction and importantly that of water drop/slug formation at 2nd T-junction was simulated under different flow conditions ($Ca_{oil} = 2.63 \times 10^{-3} - 1.101$; $We_{air} = 4.24 \times 10^{-4} - 2.62 \times 10^{-3}$; $We_{water} = 0.0431 - 7.14$) and different surfactant concentrations (0.3 and 2 wt/wt %) in aqueous phase. The predicted formation mechanisms, three-phase flow regimes, and drop/bubble/slug lengths were compared quantitatively with the measurements. The different mechanisms of bubble/slug formation, prevailing under the values of the Ca_{oil} and We_{air} , and bubble/slug lengths were predicted in a satisfactory agreement with the measurements. The complex formation mechanism of water drops/slugs that was governed by viscous

Download English Version:

<https://daneshyari.com/en/article/6579490>

Download Persian Version:

<https://daneshyari.com/article/6579490>

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