

Accepted Manuscript

Description of droplet coalescence and breakup in emulsions through a homogeneous Population Balance Model

Simone Castellano, Nida Sheibat-Othman, Daniele Marchisio, Antonio Buffo, Sophie Charton

PII: S1385-8947(18)31426-8
DOI: <https://doi.org/10.1016/j.cej.2018.07.176>
Reference: CEJ 19574

To appear in: *Chemical Engineering Journal*

Received Date: 14 May 2018
Revised Date: 4 July 2018
Accepted Date: 26 July 2018

Please cite this article as: S. Castellano, N. Sheibat-Othman, D. Marchisio, A. Buffo, S. Charton, Description of droplet coalescence and breakup in emulsions through a homogeneous Population Balance Model, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.07.176>

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.



Description of droplet coalescence and breakup in emulsions through a homogeneous Population Balance Model

Simone Castellano^{1,2}, Nida Sheibat-Othman², Daniele Marchisio³,

Antonio Buffo³ and Sophie Charton^{1*}

¹CEA, DEN, Research Department on Mining and Fuel Recycling Processes, SA2I, FR-30207, Bagnols-sur-Cèze, France

²Université Claude Bernard Lyon 1, CNRS, UMR 5007, LAGEP, 43 bd 11 Novembre 1918, FR-69622 Villeurbanne, France

³Politecnico di Torino, Dipartimento di Scienza Applicate e Tecnologie, Corso Duca degli Abruzzi 24, IT-10129, Torino, Italy

* *Corresponding author:* sophie.charton@cea.fr

Abstract

A zero-dimensional homogenous Population Balance Model (PBM) based on the evaluation of the volume-averaged coalescence and breakup rates is here adopted for the first time to fit the model parameter values through experiments carried out on a water-oil emulsion. The method accounts for the spatial inhomogeneities in mixing, namely for the probability density function of the turbulent kinetic energy dissipation in the apparatus, but avoids the use of coupling the PBM with computational fluid dynamics (CFD) or compartmentalization, thus ensuring fast computational time. In order to demonstrate the advantage of the proposed model over traditional ones based on the volume-averaged turbulent kinetic energy dissipation rate, the operating conditions were varied, including the mixing rate, the disperse phase fraction as well as considering inverse emulsions (water in oil and oil in water). The new model was found to be more generalizable to different operating conditions.

Download English Version:

<https://daneshyari.com/en/article/11000230>

Download Persian Version:

<https://daneshyari.com/article/11000230>

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