

## Accepted Manuscript

Title: Temperature controlled interval contact design for ultrasound assisted liquid-liquid extraction

Authors: Jinu Joseph John, Simon Kuhn, Leen Braeken, Tom Van Gerven



PII: S0263-8762(17)30354-4  
DOI: <http://dx.doi.org/doi:10.1016/j.cherd.2017.06.025>  
Reference: CHERD 2728

To appear in:

Received date: 21-12-2016  
Revised date: 13-6-2017  
Accepted date: 17-6-2017

Please cite this article as: John, Jinu Joseph, Kuhn, Simon, Braeken, Leen, Gerven, Tom Van, Temperature controlled interval contact design for ultrasound assisted liquid-liquid extraction. *Chemical Engineering Research and Design* <http://dx.doi.org/10.1016/j.cherd.2017.06.025>

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.

# Temperature controlled interval contact design for ultrasound assisted liquid-liquid extraction

Jinu Joseph John<sup>1</sup>, Simon Kuhn<sup>1</sup>, Leen Braeken<sup>2</sup>, Tom Van Gerven<sup>1</sup>

<sup>1</sup>Process Engineering for Sustainable Systems (ProcESS), Department of Chemical Engineering, KU Leuven, Leuven, Belgium

<sup>2</sup>KU Leuven Lab4U - Faculty of Industrial Engineering, Agoralaan Building B, B-3590 Diepenbeek, Belgium

## Highlights

- Ultrasound reactor for solvent extraction with temperature control is designed
- Methods are studied to contact the ultrasound transducer with the reaction mixture
- Closed interval contact proved to most robust
- Reactor can be scaled up 10 times without loss of relative yield improvement

## Abstract

This work aims at constructing a design which integrates a direct (solid) contact method with temperature control for chemical process applications. To realise this integration a two-step approach is proposed. Firstly, temperature control is achieved by suspending the tubing in a temperature controlled and sonicated liquid medium (indirect contact). Secondly, direct contact elements are introduced at regular intervals along the tubing. Therefore, this design is termed the hybrid contact reactor, as it incorporates both direct and indirect approaches of ultrasound transfer. Furthermore, two possible configurations, open and closed interval connection to the tubing, were assessed. Both hybrid reactors performed better than the indirect contact reactor (20 to 27 % increase in yield) for residence times of less than 45 s and similar for residence times above. Even though the performance of the two hybrid designs was similar the closed interval resulted in more reproducible and distinct yields. This configuration was then scaled up 10 times in internal volume using a 2 mm ID tube. This design showed a relative performance similar to the interval contact design which gave the highest yields thus far for the same operating conditions.

Download English Version:

<https://daneshyari.com/en/article/4987093>

Download Persian Version:

<https://daneshyari.com/article/4987093>

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