

Accepted Manuscript

Title: Utilization of Micro-Mixers for Supercritical Fluid Fractionation: Influence of the Residence Time

Author: Candela Campos Domínguez Thomas Gamse

PII: S0896-8446(16)30499-5

DOI: <http://dx.doi.org/doi:10.1016/j.supflu.2017.03.012>

Reference: SUPFLU 3881

To appear in: *J. of Supercritical Fluids*

Received date: 1-12-2016

Revised date: 12-3-2017

Accepted date: 14-3-2017



Please cite this article as: C.C. Domínguez, Start Utilization of Micro-Mixers for Supercritical Fluid Fractionation: Influence of the Residence Time, *The Journal of Supercritical Fluids* (2017), <http://dx.doi.org/10.1016/j.supflu.2017.03.012>

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.

Utilization of Micro-Mixers for Supercritical Fluid Fractionation: Influence of the Residence Time

Candela Campos Domínguez, Thomas Gamse

Graz University of Technology, Institute of Chemical Engineering and Environmental Technology, Inffeldgasse 25 C, Graz 8010/Austria; E-mail: Thomas.gamse@tugraz.at

Abstract

The utilization of micro-mixers for Supercritical Fluid Fractionation (SFF) was investigated in this work. Two different mixing principles were tested: multi-lamination and T-type lamination. The extraction of ethanol from aqueous solutions by supercritical carbon dioxide (scCO₂) was chosen as the model system. The influence of the average residence time on the extraction results was studied by varying the capillary length as well as the overall flow rate. Experimental results proved that thermodynamic equilibrium is reached in the micro-mixer and therefore the extraction cannot be enhanced by increasing the capillary length. On the other hand, in the experiments with different overall flow rate but same solvent-to-feed ratio (S/F), changes in the *K-factor* were observed when having a feed of 50 wt.% ethanol: the *K-factor* decreased as the total volumetric flow rate increased. Nevertheless, for the feed concentrations of 10 wt.% and 90 wt.% of ethanol, no significant changes were observed when the total flow rate was increased.

1. Introduction

Within the last decades, different applications of micro-process technology have been developed: micro-mixers, micro heat exchangers, micro-evaporators, micro-extractors, micro-distillators or micro-membrane devices [1]. It has been highlighted that the small scale and the high surface-to-volume ratio in microfluidics offer numerous advantages for chemical processes [2]. The utilization of micro-mixers in particular has been demonstrated to be very advantageous in processes such as chemical reaction or extraction. It has been proved that liquid-liquid extraction benefits from microfluidics as the short path lengths and large interfacial area between the two liquid phases can enhance the extraction efficiency and equilibrium can be

Download English Version:

<https://daneshyari.com/en/article/6670496>

Download Persian Version:

<https://daneshyari.com/article/6670496>

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