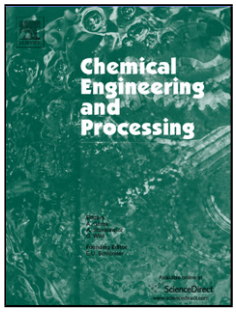

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PII: S0255-2701(17)31251-5
DOI: https://doi.org/10.1016/j.cep.2018.08.007
Reference: CEP 7355

To appear in: *Chemical Engineering and Processing*

Received date: 8-12-2017
Revised date: 15-7-2018
Accepted date: 8-8-2018

Please cite this article as: Darekar M, Singh KK, Sapkale P, Goswami AK, Mukhopadhyay S, Shenoy KT, On microfluidic solvent extraction of uranium, *Chemical Engineering and Processing - Process Intensification* (2018), https://doi.org/10.1016/j.cep.2018.08.007

On microfluidic solvent extraction of uranium

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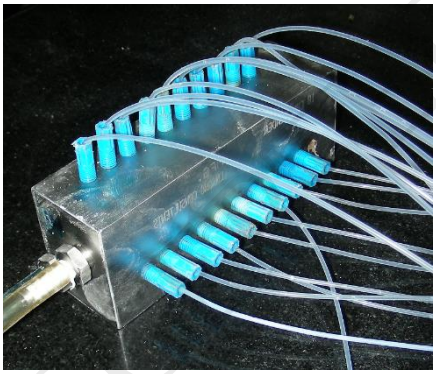
Abstract

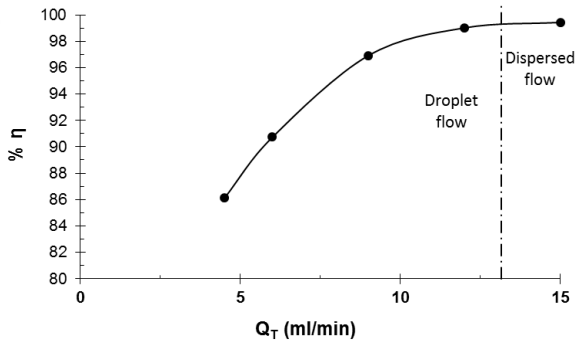
This experimental study is focused on several aspects of microfluidic solvent extraction of uranium in a set up comprising of microbore tube(s) connected to opposed T-junction(s). Experiments are carried out using simulated lean aqueous phase having 550 ppm uranium in 1 M HNO_3 as the feed. The organic phase consists of 30% (v/v) tributyl phosphate (TBP) in dodecane. The effects of flow rate on flow pattern, mass transfer and settling are studied. Performance of a straight microbore tube is compared with a coiled microbore tube of identical diameter and length. Two-stage extraction and stripping at total flow rate of 10 LPH are demonstrated using 20 parallel microbore tubes to highlight the ease of scale-up by numbering up.

Keywords: dodecane, extraction, flow pattern, microfluidic, microbore, uranium, TBP

Graphical Abstract



MDIMJ: Monoblock distributor with in-built microfluidic junctions



Effect of total flow rate on percentage efficiency (O/A=2/1)

Highlights

- Solvent extraction of uranium in microbore tubes
- Effect of flow pattern on mass transfer and settling of dispersion
- Effect of coiling of microbore tube on mass transfer