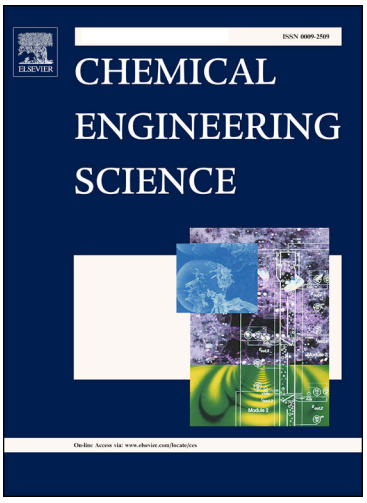


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PII: S0009-2509(18)30155-6
DOI: https://doi.org/10.1016/j.ces.2018.03.025
Reference: CES 14099

To appear in: *Chemical Engineering Science*

Received Date: 28 September 2017
Revised Date: 7 March 2018
Accepted Date: 12 March 2018

Please cite this article as: A. Lejeune, M. Rabiller-Baudry, T. Renouard, B. Balannec, Y. Liu, J. Augello, D. Wolbert, Assessment and potential of membrane cascades for organic solvent nanofiltration of hydroformylation media through a graphical representation composed of performance maps, *Chemical Engineering Science* (2018), doi: https://doi.org/10.1016/j.ces.2018.03.025

Submitted to Chemical Engineering Science - 28/09/2017- revised version submitted 22/12/2017

**Revised Manuscript with corrections**

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## Abstract

This paper aims at proposing a graphical representation composed of several performance maps to help to answer to some current questions that can puzzle membrane end-users facing the arrangement of membranes in cascade in order to better master separation of complex media. Indeed, different compromises can be highlighted according to realistic goals for the separation such as quality and recovery yield of each fraction/component, energy consumption and required membrane area. This representation needed first the systematic simulations of cascades of pre-selected configurations. These last ones were chosen thanks to the target application field, namely the organic solvent nanofiltration of a final synthesis media of hydroformylation that is a homogeneous catalysed reaction. We voluntary assumed the *a priori* limitation of the number of stages to 5, anticipating that more complex cascades will probably be too expensive (both operating and capital costs). The graphical representation by itself is based on sets of six 2D-maps. Each map highlights relationships selected in an appropriate way between two of the six selected criteria: extraction/recovery, retentate/permeate quality/purity, membrane filtering area and overall energy consumption. For sake of illustration, the separation of 2 components **C** and **A** was considered. **C**/**A** has been chosen in a 1/1000 molar ratio, where **C** corresponds to the less retained component of the catalytic system that must be recovered in the retentate and **A** corresponds to the less transmitted product to extract in the permeate. In realistic nanofiltration conditions achieved in toluene, the rejections were experimentally determined on the initial media to filter. **C** has a high rejection (88%) whereas A has a low one (30%). The simulations of cascades were established using these constant values for rejection and the experimental permeate flux. For sake of an illustration of the use of the graphical representation, a case study was finally discussed regarding a given target of recovery for the two desired components, namely at least 99% of **C** recovery and better than 70% of **A** extraction. A complementary multi-criteria analysis was added aiming at facilitating the decision-making.