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Flux and energy requirement during ultrafiltration of a complex industrial process stream

Anna-Karin Nordin, Ann-Sofi Jönsson*

Department of Chemical Engineering, Lund University, PO Box 124, SE-221 00 Lund, Sweden
Tel. +46 46 222 8291; Fax +46 46 222 4526; email: ann-sofi.jonsson@chemeng.lth.se

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ABSTRACT

Membrane filtration is a separation process already used in many industrial applications. However, optimization of the design and operating conditions is necessary to lower the investment and operating costs. To achieve this for industrial (multi-component) process streams, a combination of experiments and calculations is needed. The permeate flux and energy requirement are important design parameters for ultrafiltration plants. The influence of the operating conditions on these factors should therefore be investigated. In this work, bench-scale filtration experiments were performed on kraft black liquor using a ceramic membrane. The experimental data were used to calculate the average flux and energy requirement for different transmembrane pressures and crossflow velocities. The optimal flux at different inlet cross-flow velocities was found to vary depending on feed concentration and transmembrane pressure.

Keywords: Ultrafiltration; Kraft black liquor; Lignin; Ceramic membrane; Operating conditions

* Corresponding author.