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Optimal operation of selective membrane separation processes for wastewater treatment

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Abstract

The objective of this work is to identify and select optimally the main operating conditions of selective membrane separation processes for wastewater treatment. The advantage of this technology is that it reduces the amount of metals disposed into the environment, by removing them from wastewater and concentrating them simultaneously in the stripping stream for re-use in the plant that generates the effluent. The operating conditions are evaluated solving an optimisation problem, where the set of algebraic and differential equations that represent the component mass balances are formulated as equality constraints, together with the separation objectives that are posed as inequality end point constraints. The optimisation leads to significant improvements in terms of the flow rate of the effluent treated, showing the potential of the methodology presented. Insight on the dynamic behaviour of the selective membrane separation processes is gained through the sensitivity analysis.

Keywords: Selective membranes; Wastewater; Cr(VI) recovery; Optimal operation

Article Outline

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Table 1. Optimal operating conditions, solution of problem P1.

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Table 2. Improvement of the operating conditions of the NDSX pilot plant

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Table 3. Optimal operating conditions at variable effluent Cr(VI) composition



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