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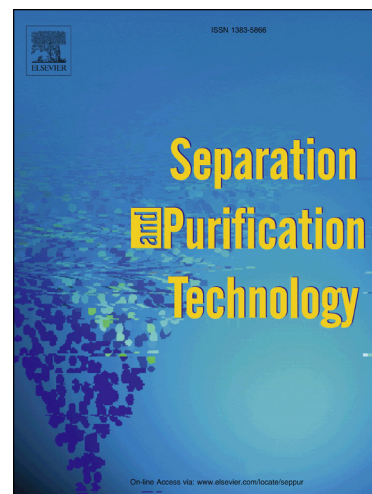
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A PLS model for predicting rejection of trace organic compounds by nanofiltration using treated wastewater as feed

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Abstract

In this study a Partial Least Squares Projection of Latent Structures (PLS) model has been developed for predicting the rejection of pharmaceutical residuals by nanofiltration (NF) using treated municipal wastewater as feed. The objective was to provide a practical tool for wastewater reuse facilities for estimating the rejection of emerging organic contaminants based on their physiochemical characteristics. The model was developed by identifying the important physiochemical properties of pharmaceutical residuals for rejection by NF. The investigated pharmaceuticals were those present in the effluent from Henriksdal wastewater treatment plant (WWTP), Sweden. The rejection, at volume reduction factors (VRF) ranging from 2 to 20, was examined in a NF pilot plant at two occasions. The important variables for rejection by NF were, in descending order: polarizability, globularity, ratio hydrophobic to polar water accessible surface area and compound charge.

Two studies were performed with a time interval of about a year with different wastewater matrices and age of membranes. For different VRFs, but in the same study, the model produced consistent predicted rejections. For the same VRF, but in the different studies, the regression lines were almost parallel, but with a deviation of about 7% for the predicted values. Most of the compounds were within the 95% prediction interval. The model also proved to be able to predict rejection using data from the literature. This confirms that the predictive PLS model can estimate the rejection albeit, with

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