Modeling performance of commercial membranes in the low-pressure filtration coking wastewater treatment based on mathematical filtration models

Karolina Mielczarek\textsuperscript{a,*}, Jolanta Bohdziewicz\textsuperscript{b}, Maria Włodarczyk-Makuła\textsuperscript{c}, Marzena Smol\textsuperscript{c}

\textsuperscript{a}Institute of Environmental Engineering, Czestochowa University of Technology, Brzeznicka 60a, Czestochowa, Poland
Email: kmielczarek@is.pcz.czest.pl
\textsuperscript{b}Institute of Water and Wastewater Engineering, Silesian Technical University, Konarskiego 18, Gliwice, Poland
\textsuperscript{c}Department of Chemistry, Technology of Water and Wastewater, Czestochowa University of Technology, Dabrowskiego 69, Czestochowa, Poland

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\textbf{ABSTRACT}

Based on the results achieved in the coking industry wastewater ultrafiltration treatment and the presumptions of relaxation mathematical model carried out in non-stationary system, and based on the assumptions of the model of hydraulic resistance to filtration, the changes in the volumetric permeate flux in the process of membrane filtration has been described. The research was conducted on the effectiveness of the treatment of wastewater from coke plant industry. Coking industry wastewater treatment was carried out with the use of American GE-Water ultrafiltration membranes. The process of ultrafiltration was performed at 23°C, using transmembrane pressure of around 0.4 MPa and linear wastewater flow rate of 2 m/s. For all the examined membranes, the transport characteristics corresponded to the relation between the volume flux of de-ionized water and transmembrane pressure of 0.2–0.8 MPa. The level of wastewater purification was defined for raw and cleaned wastewater indicators. None of the ultrafiltration membranes allowed the high level of pollutants to be removed. Thus, they were treated by reverse osmosis method (RO). The calculations based on the assumptions of the mathematical filtration models made it possible to predict the efficiency of commercial ultrafiltration membranes used in the process.

\textit{Keywords:} Coke plant wastewater; Industrial membranes; Low- and high-pressure membrane techniques; Mathematical filtration models

*Corresponding author.

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