The assessment of changes in the membrane surface during the filtration of wastewater treatment plant effluent

Edyta Kudlek*, Mariusz Dudziak
Faculty of Energy and Environmental Engineering, Silesian University of Technology, Konarskiego 18, 44-100 Gliwice, Poland, Tel. +48 32 237-24-78; email: edyta.kudlek@polsl.pl (E. Kudlek)
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A B S T R A C T

The physicochemical composition of water matrixes has a major impact on changes in the membrane surface properties (morphology, charge). In this research, this changes reflected in the obtained retention coefficient of micropollutants in the tested water matrixes. The conducted experiments indicated that the presence of inorganic compounds especially affected the carbamazepine retention ($R = 97\%$) in the real effluent, beside the deionized water matrix ($R = 99\%$). The blocking of the membrane surface by compounds present in real wastewater treatment plant effluent was only partially reversible. Whereas the filtration of the synthetic effluent had a beneficial impact on the volumetric permeate flux. The roughness analysis showed that the membrane surface was changing during the conducted filtration processes from homogeneous to a heterogeneous one. The atomic force microscopy images gave a good visualization of changes in the membrane topography and confirmed the occurrence of the fouling process during the filtration of solutions with a diversified physicochemical composition.

Keywords: Nanofiltration; Wastewater; Fouling; AFM images