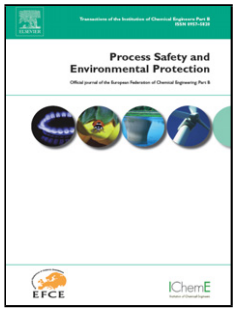

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OPTIMIZATION OF THE FOULING BEHAVIOUR OF A REVERSE OSMOSIS MEMBRANE FOR PURIFICATION OF OLIVE-OIL WASHING WASTEWATER

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Abstract

The core of this paper was the performance prediction and optimization of a reverse osmosis (RO) membrane process for purification of tertiary-treated olive-oil washing wastewater (OOW2TT). To this end, fouling control and minimization is irretrievably needed for successful implementation of membrane plants at industrial scale. Statistical multifactorial analysis showed all three operating variables - pressure (P_{TM}), tangential flow (v_t) and temperature (T) - affect the flux productivity of the membrane, confirming a statistically significant relationship among them at 95 % confidence level. However, v_t and T exhibited higher impact, according to the p-values withdrawn. On another hand, P and v_t were noted to have very relevant effect on the membrane fouling rate, thus having key implications on the stable control and feasibility of the process. These results were mirrored by the response surfaces obtained. The optimised parameters - ambient temperature (24 - 25 º C), moderate operating pressure (25 - 30 bar) and turbulent tangential flow (3.1 - 3.5 m s^{-1}) - were found to provide a stable permeate flux (32.3 L $h^{-1}m^{-2}$). These results highlight the proposed process could be operated successfully at ambient temperature conditions, boosting the economic efficiency of the RO purification of this kind of effluents.

Keywords: Reverse osmosis; Olive mill wastewater; Membrane processes; Fouling; Optimization; Wastewater Reclamation.