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# FOULING MODELING ON A REVERSE OSMOSIS MEMBRANE IN THE PURIFICATION OF PRETREATED OLIVE MILL WASTEWATER BY ADAPTED CROSSFLOW BLOCKING MECHANISMS

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## Abstract

In this work, the effect of the operation parameters (crossflow, pressure and temperature) on the individual fouling mechanisms of a RO membrane used for the purification of tertiary-treated OMW is addressed. The knowledge beforehand of the possible fouling mechanisms and the adoption of adequate operating conditions accordingly is key for the control of fouling and the steady performance of the membrane plant. The build-up of a gel layer was found to be dominant from the middle to the final moments of the membrane filtration. However, in the initial filtration periods a different mechanism, the blocking of the surface defects of the membrane, and the contribution of concentration polarization (38.6%) on the boundary region of the membrane, occurred as well before the definite build-up of the cake or gel layer. By applying medium pressure (25-15 bar), the intermediate blocking mechanism was reduced, and the formation of a cake or gel layer over the membrane skin predominated, a less strong form of fouling, whereas the increment of the crossflow (2.5 to 5.0 m s<sup>-1</sup>) reduced the gel layer formation ( $K_{gl}$ ) by 77.1 %. Upon the adopted conditions, the stable operation of the membrane regarding the rejection efficiency (COD<sub>rejection</sub> 97.5-99.1%) and flux (~ 24-32 L h<sup>-1</sup>m<sup>-2</sup>) allowed to obtain a final purified effluent compatible for irrigation.

*Keywords:* olive mill wastewater, modeling, fouling, reverse osmosis, crossflow, wastewater reclamation.

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