



## Membrane fouling characterization and cleaning adaptation in wastewater reclamation plants: from plant to lab

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### ABSTRACT

Membrane biofouling represents an important drawback in full-scale water reclamation plants as it affects energy consumption, permeate productivity and even quality. Due to the high number of water-/membrane-/site-specific variables affecting membrane fouling and lifetime, cleaning and maintenance procedures need to be specifically designed for each application. Cleaning activities cannot directly be optimized onsite due to the necessity of ensuring a constant and safe product water flow and quality. For this reason, cleaning optimization needs to be transposed from plant to lab. In this work, a Spanish wastewater reclamation plant was selected to optimize cleaning procedures. For this, a reverse osmosis element was sampled and submitted to several cleaning protocols at lab-scale. The influence of the basic cleaning agent nature, pH and presence of additives on cleaning efficiency was studied. The optimal membrane cleaning conditions were achieved with a NaOH solution at pH 12 containing 0.03% SDS. At these conditions, permeate flux after cleaning was two fold greater than fouled membrane permeate flux. In this work, lab-scale membrane cleaning tests have shown to be a successful tool to optimize cleaning activities for full-scale plants and understand the influence of cleaning variables on membranes restoring efficiency.

*Keywords:* Membrane technology; Reverse osmosis; Fouling; Autopsy; Cleaning; Wastewater reclamation

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