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Wastewater treatment membranes: main issues and failures

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A B S T R A C T

Conventional wastewater treatment methods are well established and widely used, as they provide effective removal of pollutants. Nevertheless, the evolution of membrane technologies has significantly increased the interest in and use of advanced treatment technologies as a means to achieve higher-quality effluent and address emerging contaminants more effectively. In fact, the use of membrane technologies has enabled the treatment of wastewater for reuse with a significant reduction in equipment size, energy requirements, and capital cost [1]. The application of membranes for wastewater treatment is not a recent development, as the first membrane bioreactors (MBRs) were developed during the 1970s. During the early 2000s, membrane technologies became more integrated into municipal wastewater plants. Today, membrane technology is a key component of advanced wastewater treatment processes and is widely used in both industrial and municipal settings to produce high-quality effluent and meet stringent water quality standards. Although the water industry has made commendable efforts to improve membrane technology, it is also important to understand the challenges that may arise in some cases when dealing with complex waters. In addition to operational issues within the facilities, the presence of foulant on membrane surfaces is one of the most important challenges. Membrane autopsies are key for identifying the foulant that may occur on membranes and provide valuable information to minimise or correct fouling in the most effective way. The information obtained from membrane autopsies is also a valuable source of knowledge for understanding membrane performance in

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wastewater treatment. This paper compiles information on typical foulants affecting wastewater treatment membranes, their impact on membrane performance, and other relevant findings identified through the analysis of over 200 wastewater membranes. The aim is to provide practical insights into one of the recurring challenges faced by membranes when treating wastewater.

Keywords: Wastewater; Reuse; Membrane; Autopsy; Foulant
