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Opportunities and Challenges in Wastewater Treatment with Membrane Pressure Processes

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Compared to alternative wastewater treatment methods such as adsorption, coagulation/flocculation, usage of aerated/aerobic lagoons, and many others that enable the removal of certain types of contaminants and the creation of a large amount of waste at the end of the process, membrane pressure processes enable the removal of a wide range of contaminants and the generation of very small amounts of waste at the end of the process.[1] In this way, the wastewater can be brought to a high quality that enables further use, for example, in the production process. Membrane pressure processes such as microfiltration, ultrafiltration, nanofiltration, and reverse osmosis are gaining more and more popularity in wastewater treatment processes.[2] Apart from creating a small amount of waste, this technology does not require the use of chemicals during processing, which makes it an environmentally friendly technology.[3] Despite the mentioned advantages, membrane separation processes suffer from certain problems, e.g. membrane fouling, which can be reduced by the use of hybrid coupling. Thus, conventional processes can be combined with a membrane system or it can be a combination of several membrane processes.[4] Also, choosing membranes with a specific material can increase selectivity and permeability. Usually they are membranes made of polymer but by use sustainable natural (Zeolite, Clays, lignin) and waste-based materials (recycled polystyrene) can improved previously mentioned features. [5]

Keywords: membrane pressure processes, waste, ultrafiltration, microfiltration, nanofiltration, reverse osmosis, fouling

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