Case study on pressured microfiltration and reverse osmosis membrane systems for water reuse

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ABSTRACT

According to the announcement by OECD [1], Korea is listed as the most “severe water stress” nation among OECD countries. As competition for restricted water resources is expected in the coming decades, development of technologies for water treatment and reuse becomes urgently needed. The combined microfiltration (MF) and reverse osmosis (RO) process has been one of the mostly employed treatment methods in obtaining recyclable quality for wastewater reclamation and reuse, yet few has reported a pilot-scale investigation with the pressurized MF (without pretreatment) and RO system. The pilot plant operated in Gimcheon City Sewage Treatment Plant consists of a PVDF membrane in pressurized MF (treatment capacity of MF and RO: 30 and 20 m³/day) and a RO unit of wastewater reclamation. The result of the pilot study indicates that the reclaimed water can conform industrial water reuse standard (i.e., Turbidity (MF): 0.05 NTU, TDS (RO): 4.9 mg/L, TOC (RO): 0.79 mg/L). While the recovery rate run at the MF unit was 90%, the RO system was operated at 67%, to reach an overall system recovery rate of 60%. Herein, we report the performance of a pilot-scale pressurized MF and RO system operated for water reuse and discuss possible applications of the system for a test bed.

Keywords: Pressured microfiltration; Reverse osmosis; Water reuse; Polyvinylidene fluoride (PVDF) membrane modules

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