



Combined FO and RO system for the recovery of energy from wastewater and the desalination of seawater

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ABSTRACT

Organic matter (OM) found in wastewater represents a potential source of energy through anaerobic digestion which produces methane. However, for efficient anaerobic digestion, the OM found in raw wastewater must be concentrated to levels greater than 1,500 mg/L COD. Indeed, a COD concentration greater than 1,500–2,000 mg/L would be required for the process to generate its own heat and produce methane in a more efficient way without an external heat. In this study, the feasibility of recovering OM from wastewater with a forward osmosis (FO) process using seawater or seawater brine as a draw solution is presented. We report on the performance of different brine concentrations as draw solutions for the FO process during wastewater concentration and explore what their usage implies for the energy balance (energy recovered from OM minus the energy spent on FO and on recirculation). Two scenarios were evaluated. In the first scenario, we consider the configuration where reverse osmosis (RO) membranes are operated at different recovery rates to produce potable water and brine is used as a draw solution for FO. In the second scenario, seawater is used as a draw solution and the diluted draw solution (during FO operation), is fed to the RO membrane to produce potable water. In this study, we evaluate the theoretical energy consumption and energy recovery from concentrated sludge in each configuration.

Keywords: Energy; Desalination; Organic matter; Recovery; Wastewater

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