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Hollow fiber membrane fouling and cleaning in a membrane bioreactor for molasses wastewater treatment

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ABSTRACT

The limitation of membrane microfiltration for activated sludge wastewater treatment is membrane fouling which is indicated by the decline of the permeation flux. In this study, molasses were used to prepare a synthetic feed substrate with addition of urea $(NH_2)_2CO$ and sodium pyrophosphate Na_4PO_4 to adjust the COD:N:P ratio. A polyethersulfone hollow fiber membrane was operated under the typical range of concentrations of mixed liquor suspended solids of an activated sludge process. The membrane bioreactor (MBR) system was operated in two modes: first with increasing flux and then at constant flux. In this study, the amount of extracted extracellular polymeric substance (eEPS) was lower than in earlier reports, whereas the soluble microbial product (SMP) was quite similar. Carbohydrates were the main part for both eEPS and SMP, reflecting the composition of molasses. Since membrane fouling occurred, several maintenance and recovery cleaning procedures were tested: NaOCl, NaOCl + Memcare, and citric acid. The results showed that besides organic fouling, the inorganic fouling was also occurred.

Keywords: Molasses wastewater; Membrane performance; Membrane cleaning

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