



Technical performances of ultrafiltration applied to municipal wastewater treatment plant effluents

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ABSTRACT

The use of membrane separation like ultrafiltration for reuse of reclaimed water has become an increasingly attractive option, especially nowadays when water quality and water scarcity are stringent issues. In this study, a secondary effluent from Iasi municipal wastewater treatment plant (MWWTP) was treated in a laboratory-scale ultrafiltration equipment with 4 and 6 kDa membranes, in cross-flow operating mode, with complete recirculation of the concentrate, under various pressure conditions (1–2.5 bar) and time periods (1–4 h). Considering the technical performances of the ultrafiltration process, two main directions were followed: firstly, the assessment of membrane productivity in terms of permeate flux, volume reduction factor (VRF), and fouling index (I_f) and secondly, the evaluation of permeate quality, calculated by the removal efficiencies calculated for various water quality indicators: turbidity, Chemical Oxygen Demand (COD), Total Organic Carbon (TOC), Phenols, Total Nitrogen, Total Phosphorous (TP), Total Fe, Total Cr, Cu^{2+} , Zn^{2+} . The best results obtained on the EM006 membrane, (1 h test, pressure $p = 1.5$ bar) show removal efficiencies up to 50% in terms of organic compounds removal (COD and TOC indicators), 100% in terms of solids presence (measured by turbidity) and phenolic compounds, up to 30% reduction of TP. The permeate quality was compared with different limits of pollutants concentration, specified in the existing legislative framework for reclaimed water, in United States (US) and Spain (EU). The study indicates that ultrafiltration of the secondary municipal effluent from Iasi MWWTP, in an advanced treatment step, is a feasible option for water reclamation, but special attention is required to the compounds containing nitrogen and especially nitrates concentration which exceed the maximum admissible concentration.

Keywords: Ultrafiltration; Secondary municipal effluent; Technical performances; Advanced treatment

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