



Ageing effect on chlorinated polyethylene membrane of an MBR caused by chemical cleaning procedures

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ABSTRACT

The membrane lifetime has a strong influence on the competitiveness and sustainability of Membrane bioreactor (MBR) technology. Membrane replacement is highly expensive operational cost of MBR plants, besides generating residues that have been disposed at municipal landfills or incinerated. Chemical cleaning has been deemed to be one of the most significant factors that shortens membrane lifetime. Chemical cleaning is required to keep the operational flux that is likely to be shortened due to irreversible membrane fouling. This work was aimed to evaluate the influence of chemical agents on chlorinated polyethylene polymeric membrane. Two cleaning procedures were evaluated, namely, (1) cleaning with citric acid followed by sodium hypochlorite (NaOCl) and (2) oxalic acid followed by sodium hypochlorite. After each cleaning cycle, it was determined the membrane permeability. The membranes were also characterized by surface analysis using a scanning electron microscope, thermal resistance by thermogravimetric analysis, Fourier transform infrared spectrometry analysis, and hydrophilicity determination based on the contact angle measurement. The results showed a permeability decrease when the membrane was exposed to cleaning agents both, by adsorption of the evaluated acids or by oxidation of the polymeric material and/or the additives used to manufacture the membranes.

Keywords: Membrane lifetime; Membrane bioreactors; Chlorinated polyethylene membrane; Fouling; Chemical cleaning

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