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Effect of storage of NF membranes on fouling deposits and cleaning efficiency

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ABSTRACT

The aim of this work was to investigate changes of the foulant deposit during storage and the impact of storage onto cleaning efficiency of a nanofiltration membrane. ATR-FTIR analysis and chemical cleaning tests were performed on membrane pieces cut from a NF spiral wound module extracted from a drinking water plant just after sampling or stored for 4 or 8 weeks in distilled water at 4°C. Membrane permeability of flat sheets was measured before and after cleaning with a cross flow lab-scale pilot. For the non stored membrane, an homogeneous biofouling deposit was observed on the membrane surface by ATR-FTIR analysis. During membrane storage, some heterogeneity between the spectra, corresponding to different areas of the membrane appeared. A decrease of IR signals of foulants was observed after the first 4 weeks of storage; thereafter the IR signals remained approximately the same. The membrane permeability of the fouled flat sheets increased slightly after 4 weeks and remained stable after 8 weeks of storage. After cleaning, the biofilm IR signals of the membrane samples analyzed immediately after sampling or stored for 4 weeks decreased significantly. Cleaning had no significant effects on the biofoulant deposit after a storage of 8 weeks. Increases in permeability of 10, 5, and 5% were obtained after cleaning of the fouled flat sheets not stored, stored for 4 or 8 weeks, respectively. In conclusion, the storage of fouled NF membrane cuts in distilled water at 4°C conducted to alterations of the biofouling deposit but was compatible with cleaning efficiency tests after a storage period of 4 weeks at the most.

Keywords: ATR-FTIR; Chemical cleaning; Fouling; Nanofiltration; Permeability

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