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Removal of humic acid and chloroform from drinking water by using commercial nanofiltration and reverse osmosis membranes

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ABSTRACT

The removal of disinfection byproducts (DBPs) or their precursors has become an essential step during water treatment processes due to their negative health effects. In this work, the efficiency of commercial nanofiltration (NF) and reverse osmosis (RO) membranes for the removal of chloroform (CF, as the major component of DBPs formed during the chlorination of River Nile water) and humic acid (HA, as the main precursor of DBPs) from drinking water was investigated. Six different commercial membranes were used including NF-90 and NF-270 for NF process and TM-820, SW-30, BW-30 and XLE for RO process. The surface and structural properties of the commercial membranes were characterized using different techniques. From the rejection tests, the whole six membranes removed ca. 100% of HA. In case of CF, NF-90 rejected about 92%, while NF-270 rejected only 76%. The rejection of CF using RO membranes ranged from 94% to 98.5%. CF rejection using the best membranes (SW-30 and BW-30) was tested in a long term filtration experiment (up to 21 h). During this experiment, BW-30 and SW-30 had high rejection efficiency for CF with only a slight decrease in the flux. The current results demonstrate that both SW-30 and BW-30 membranes can be used efficiently to control the DBPs level in drinking water.

Keywords: Humic acid; DBPs; Chloroform; Nanofiltration; Reverse osmosis membranes

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