

Assessment of SW30 membrane for simultaneous removal of selected microelements from high-mineralized water

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ABSTRACT

Maximum permissible concentrations of inorganic elements, including toxic constituents (heavy metals), in drinking water, are established by the World Health Organization (WHO), EU Council Directive 98/83/EC of 3 November 1998, and relevant national regulations. The paper presents an assessment of reverse osmosis SW30 membranes for simultaneous removal of boron, copper, and lithium from two high-mineralized water. The experiments conducted allowed to gain removal up to the following values (retention coefficients): boron (30% and 8%), copper (89% and 69%), and lithium (39% and 8%), in permeates. Despite the quite promising removal ratios gained for copper and lithium, the value of reduction of mineralization, boron, and some of the major ions was insufficient and their concentration values exceeded the parametric value introduced in the mentioned Directive. In concentrates with these three parameters, negligible increases in concentrations were observed. The research work carried out provided that the treatment of high-mineralized water with increased content of microelements with the use of a one-step reverse osmosis system is not an effective enough solution. Due to the unsatisfactory boron removal and mineralization reduction being gained, further studies should be carried out to improve the efficiency of removal of these components, for example, the use of a multistage desalination process or secondary treatment.

Keywords: Seawater; Membrane; Desalination; Reverse osmosis; Copper; Boron; Lithium

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