Boron removal by membrane processes

Amine Mnif\textsuperscript{a}, B. Hamrouni\textsuperscript{a}, M. Dhahbi\textsuperscript{b}

\textsuperscript{a} UR Dessalement et Traitement des Eaux, Faculté des Sciences de Tunis, 2092 Manar II, Tunisia  
Tel/Fax: +216 71 87 12 82, email: amine.mnif@gmail.com  
\textsuperscript{b} Laboratoire Eau et Technologies Membranaire, CERTE, Technopôle Borj Cédria, BP 273, Soliman 8020, Tunisia

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\begin{abstract}
Boron has been widely distributed in the environment, in most cases at low concentrations. Due to its detrimental effect on the reproducibility of living organisms, the European Union stipulates the maximum admissible value for the concentration of boron at 1 ppm and the World Health Organisation at 0.3 ppm as the non-observed effect level (NOEL) for drinking water. The aim of this work is the boron removal by membrane processes, in particularly the evaluation of the effect of nanofiltration and reverse osmosis membranes, as their coupling was also studied on the elimination of boron. The RO and NF tests were carried out with the use of an Osmonics spiral module equipped with AG2514 TF and HL2514T membranes respectively. Using conventional membranes, significant removal of boron has been observed only in its ionic form. Our experimental results indicated that boron rejection mostly depends upon membrane type, pH level, and to a lesser extent on the recovery. More detailed analysis of the above-mentioned results showed that boron can be effectively removed only at a pH shifted feed water close to 11. Initial data on coupling of the two RO/NF membranes are discussed.

Keywords: Boron removal; Reverse osmosis; Nanofiltration
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\* Corresponding author.