Performance of nanofiltration and reverse osmosis membranes for arsenic removal from drinking water

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\textbf{ABSTRACT}

The removal of arsenic was investigated by four types of thin-film polyamide nanofiltration (NF) (NF270, NF90) and reverse osmosis (RO) (XLE, BW30) membranes in a flat-sheet module. The influence of membrane types, pressure, pH, and pre-oxidation step on the removal of arsenic (As(III)) was investigated. Initial As(III) concentration was 100 \(\mu\)g/l for all of the experiments. Flux was determined over a pressure range of 3.5–10 bar for both NF and RO membranes. Experiments were conducted at pH 3.5, 5, 7.5, and 10 to evaluate the effect of pH on As(III) removal. The impact of pre-oxidation and oxidant concentrations on As(III) removal were also evaluated. It was found that the percentage of As(III) removal of RO membranes were in the range of 97–99 for all transmembrane pressure applied. In the range of operating conditions, As(III) and As(V) rejection were found almost equally good by RO membranes. RO permeate met the WHO and Turkish standard for arsenic. Pre-oxidation step improved the rejection performance of NF. Nevertheless, NF permeate did not meet the standards in the range of operating conditions.

\textit{Keywords:} Arsenite; Arsenic removal; Oxidation; Nanofiltration; Reverse osmosis