

**Title:** Nanofiltration of surface water for the removal of endocrine disruptors

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**Abstract:** The assessment of surface water nanofiltration (NF) for the removal of endocrine disruptors (EDs) Nonylphenol Ethoxylate (IGEPAL), 4-Nonylphenol (NP) and 4-Octylphenol (OP) was carried out with three commercial NF membranes - NF90, NF200, NF270. The permeation experiments were conducted in laboratory flat-cell units of  $13.2 \times 10^{-4}$  m<sup>2</sup> of surface area and in a DSS Lab-unit M20 with a membrane surface area of 0.036 m<sup>2</sup>. The membranes hydraulic permeabilities ranged from 3.7 to 15.6 kg/h/m<sup>2</sup>/bar and the rejection coefficients to NaCl, Na<sub>2</sub>SO<sub>4</sub> and Glucose are for NF90: 97%, 99% and 97%, respectively; for NF200: 66%, 98% and 90%, respectively and for NF270: 48%, 94% and 84%, respectively. Three sets of nanofiltration experiments were carried out: i) NF of aqueous model solutions of NP, IGEPAL and OP running in total recirculation mode; ii) NF of surface water from Rio Sado (Settibal, Portugal) running in concentration mode; iii) NF of surface water from Rio Sado inoculated with NP, IGEPAL and OP running in concentration mode. The results of model solutions experiments showed that the EDs rejection coefficients are approximately 100% for all the membranes. The results obtained for the surface water showed that the rejection coefficients to natural organic Matter (NOM) are 94%, 82% and 78% for NF90, NF200 and NF 270 membranes respectively, with and without inoculation of EDs. The rejection coefficients to EDs in surface water with and without inoculation of EDs are 100%, showing that there is a fraction of NOM of high molecular weight that retains the EDs in the concentrate and that there is a fraction of NOM of low molecular weight that permeates through the NF membranes free of EDs.

**Author Keywords:** Nanofiltration; Surface Water Treatment; Endocrine Disruptors; Natural Organic Matter; Drinking Water; Nonylphenol Ethoxylate; 4-Nonylphenol; 4-Octylphenol

**Keywords Plus:** Natural Organic-Matter; Alkylphenol Polyethoxylate Surfactants; Solid-Phase Extraction; Rejection Properties; Aquatic Environment; Bisphenol-A; Membranes; Ultrafiltration; Nonylphenol; Drinking

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