

Measuring transparent exopolymer particles (TEP) as indicator of the (bio)fouling potential of RO feed water

Loreen O. Villacorte^{a*}, Maria D. Kennedy^a, Gary L. Amy^{a,b}, Jan C. Schippers^a

^aUNESCO-IHE, Institute for Water Education, Westvest 7, 2611 AX Delft, The Netherlands

Tel.: +31 15 215 1715; Fax: +31 15 212 2921; emails: L.Villacorte@unesco-ihe.org; M.Kennedy@unesco-ihe.org;

G.Amy@unesco-ihe.org; J.Schippers@unesco-ihe.org

^bDelft University of Technology, Stevinweg 1, 2628 CN Delft, The Netherlands

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ABSTRACT

Transparent exopolymer particles (TEP) are an abundant type of EPS in surface waters which were recently regarded as major initiators of biofilm formation on reverse osmosis (RO) membranes. The goal of this study was to monitor the presence of these substances in RO feed water and its removal by pre-treatment with MF/UF. Modifications were applied on the existing TEP determination method to measure both particulate ($>0.4 \mu\text{m}$) and colloidal ($0.05\text{--}0.40 \mu\text{m}$) TEP. Results show colloidal TEPs (c-TEP) were more abundant than particulate TEP (p-TEP) in both fresh and sea water samples, affirming the importance of measuring this often neglected colloidal fraction. Higher TEP concentrations were recorded in seawater than in freshwater samples and a significant variation of TEP concentration was observed in seawater samples collected during the spring season. In two integrated membrane systems (IMS), 70–75% of TEP removal was recorded by MF and UF with inline coagulation. However, significant amounts of TEP (mostly c-TEP) remained after MF/UF pretreatments, and this may potentially cause organic and/or biological fouling in the RO system downstream.

Keywords: Transparent exopolymer particles; Reverse osmosis; Biofouling; Integrated membrane systems

* Corresponding author.

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