

Removal of emerging contaminants of industrial origin by NF/RO – A pilot scale study

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Received 15 September 2008; Accepted 23 May 2009

ABSTRACT

In this study a recently built NF/RO pilot unit for removal of emerging contaminants from a plant producing veterinary pharmaceuticals was tested. A wastewater stream of the plant, containing residuals of antibiotics and other organics was treated by three different types of reverse osmosis (RO) and nanofiltration membranes: XLE, NF90 and HL. Target compounds selected for this study included three different classes of antibiotics: sulphonamides, diaminopyrimidine and fluoroquinolone. A developed chromatographic method for determination of pharmaceuticals in a complex wastewater was applied. The method involved a sample pretreatment by solid-phase extraction (SPE) and analytical determination by high performance liquid chromatography (HPLC) with DAD detectors. The results showed the complete removal of all the antibiotics by the typical RO XLE membrane and by the tight nanofiltration membrane NF90. Only the loose nanofiltration membrane element HL incompletely rejected the smaller sulphonamide molecules. The satisfactory rejection of other solutes from a complex wastewater stream was also obtained.

Keywords: Emerging contaminants; Veterinary antibiotics; Wastewater; RO/NF pilot treatment; SPE-HPLC-DAD

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