



Pharmaceutical Wastewater Treatment With Membrane Bioreactor, Nano-Filtration and Reverse Osmosis

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ABSTRACT

The treatment of pharmaceutical and personal care products (PPCPs) wastewater is gaining widespread attention as an emerging contaminant¹ worldwide. The study focused on evaluating PPCPs wastewater treatment of Uruguay's pharmaceutical company called Gramon Bago. Gramon Bago produced an effluent with high BOD (3,000-9,000mg/L), COD (5,000 and 20,000 mg/L) and toxicity (as low as 1%) that was not compliant with the Uruguayan effluent standards (Decree 253/79) to dispose into the municipal sewer. The overall aim of the project was to understand the cause of high toxicity and determine an effective treatment train. A pilot 1m³ aerobic membrane bio-reactor plant was trialed. The MBR was effective in removal of BOD, COD, TSS, and not toxicity. Therefore further studies were carried out with lab-scale nanofiltration and reverse osmosis plants in order to determine an effective polishing/post treatment step. The NF process proved ineffective compared to RO and did not remove much APIs such that the wastewater remained very toxic. Although the RO process completely removed toxicity, there was need to reconstitute the water with mineral salts so that the RO permeate was not toxic to daphnids during the *Daphnia magna* acute toxicity test. Addition of salts was done from a hardness of 0 mg/L to at least above 25 mg/L according to Canada's Environmental standard on testing effluent toxicity to *Daphnia magna*.

Keywords: *Daphnia magna*; toxicity; personal care products

¹ Chemicals which can cause harm to humans and or animals that are not regulated or don not have regulation standards. Workgroup OOE (2008) Aquatic Life Criteria for Contaminants of Emerging Concern: General Challenges and Recommendations White Paper 86