

## Reverse Osmosis Application on Sewage Tertiary Treatment

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**Abstract :** Water is an indispensable natural resource, which must be preserved to human activities as well the ecosystems. However, the sewage discharge has been contaminating water resources. Conventional treatment, such as physicochemical treatment followed by biological processes, has not been efficient to the complete degradation of persistent organic compounds, such as medicines and hormones. Therefore, the use of advanced technologies to sewage treatment has become urgent and necessary. The aim of this study was to apply Reverse Osmosis (RO) on sewage tertiary treatment from a Waste Water Treatment Plant (WWTP) in south Brazil. It was collected 200 L of sewage pre-treated by wetland with aquatic macrophytes. The sewage was treated in a RO pilot plant, using a polyamide membrane BW30-4040 model (DOW FILMTEC), with 7.2 m<sup>2</sup> membrane area. In order to avoid damage to the equipment, this system contains a pleated polyester filter with 5 µm pore size. It was applied 8 bar until achieve 5 times of concentration, obtaining 80% of recovery of permeate, with 10 L.min<sup>-1</sup> of concentrate flow rate. Samples of sewage pre-treated on WWTP, permeate and concentrate generated on RO was analyzed for physicochemical parameters and by gas chromatography (GC) to qualitative analysis of organic compounds. The results proved that the sewage treated on WWTP does not comply with the limit of phosphorus and nitrogen of Brazilian legislation. Besides this, it was found many organic compounds in this sewage, such as benzene, which is carcinogenic. Analyzing permeate results, it was verified that the RO as sewage tertiary treatment was efficient to remove of physicochemical parameters, achieving 100% of iron, copper, zinc and phosphorus removal, 98% of color removal, 91% of BOD and 62% of ammoniacal nitrogen. RO was capable of removing organic compounds, however, it was verified the presence of some organic compounds on de RO permeate, showing that RO did not have the capacity of removal all organic compounds of sewage. It has to be considered that permeate showed lower intensity of peaks in chromatogram in comparison to the sewage of WWTP. It is important to note that the concentrate generate on RO needs a treatment before its disposal in environment.

**Keywords :** organic compounds, reverse osmosis, sewage treatment, tertiary treatment

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