

## Performance of three ultrafiltration ceramic membranes in reducing polluting load of landfill leachate

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### ABSTRACT

The Oum Azza Landfill, which is located in the suburb of Rabat, receives daily 2,500–2,800 t of solid waste and produces 660 m<sup>3</sup>/d of landfill leachate. The leachate treatment plant of Oum Azza includes a biological pretreatment (aeration tank and anoxic tank followed by a bag filter), and a membrane processes by reverse osmosis (RO). A low RO recovery rate and frequent stops caused by membranes fouling have been observed, this behavior is mainly due to the poor quality of the effluent after pretreatment. To address this problem and improve the physico-chemical quality of the effluent upstream of the RO processes, we consider in this paper the feasibility of ultrafiltration (UF) separation as a pretreatment. The purpose of this study is to evaluate and compare the performance of three ceramic UF membranes with different pore sizes (0.02, 0.05 and 0.1 µm). The transmembrane pressure (TMP) and circulation velocity effect on the quantity and the quality of permeate and on the removal efficiency of chemical oxygen demand (COD) and suspended solid (SS) are performed. The pretreatment of the leachate by UF shows that the SS and COD retention increase with TMP for all the tested membranes and reach, for a circulation velocity of 0.5 m/s, the maximum values of 85%, 77% and 72% respectively for COD and 70.4%, 62% and 55% for SS. On the other hand, the study shows that circulation velocity has no influence on the physico-chemical quality of the permeate in the range of the applied TMP. However, for an applied TMP, the flow rate increases with the circulation velocity. The results obtained show a clear improvement in effluent quality compared to the conventional pretreatment used in the leachate treatment plant of Oum Azza but pollutants indicators contents are still high and the effluent cannot be directed to the RO unit. Three methods are proposed to perfect the quality of the effluent at the entrance of the RO unit.

**Keywords:** Landfill leachate; Pollutant load; ultrafiltration; Ceramic membrane; Membrane fouling

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