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Hybrid system of nanofiltration, reverse osmosis and evaporation to treat the brine of inland desalination plants

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ABSTRACT

This work is focused on the brine management of brackish water from desalination plants placed in inland areas. In inland areas the aquifers and other water resources present problems of pollution caused mainly by agricultural activities. In these areas, desalination plants are normally used to produce drinking-water from brackish water. However, the management of the concentrates generated by these plants is a big challenge due to the environmental problems of their disposal in the environment. One possible solution is the combination of membrane processes with low-cost evaporation technologies. This paper presents a theoretical analysis and preliminary experimental results for an innovative system to manage brines of desalination plants. The system treats sequentially the brine coming from a brackish water desalination plant in a nanofiltration stage (NF) and a natural evaporation process with absorbent surfaces. An osmosis stage (RO) treats the permeate from the NF stage. This hybrid system allows obtaining an additional water resource. The evaporation stage based on absorbent surfaces reduced land requirements by 90% in contrast with the land requirements in evaporation ponds.

Keywords: Nanofiltration; Reverse osmosis; Evaporation; Brine

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