



Design and performance of a new zero-wastewater small-size reverse osmosis desalination system

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ABSTRACT

A modified reverse osmosis (RO) system with zero wastewater was developed, and its performance was tested against allowable limits of total dissolved solids (TDS) in Jordan. New components were added to the typical single- and double-membrane RO systems used in private homes to re-direct the amount of saline water rejects to drainage. Instead, this water is mixed with input water from the source. Then, the mixed water is used for domestic household purposes other than drinking. The TDS values of output fresh water and mixed water were tested and found to be within safe limits. The new components can be fitted to existing systems with a small amount of extra space. The reuse of saline water after mixing does not require human interaction, and the system can be fully utilized for safe and continuous operation. The newly modified system produced huge water savings relative to existing systems. The implementation of modified RO plants could save a country like Jordan, 18 million cubic meters of supplied input water annually, based on 500,000 RO units operating in Jordanian homes, with 100% water recovery.

Keywords: Reverse osmosis; Zero waste water; Control unit; Jordan

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