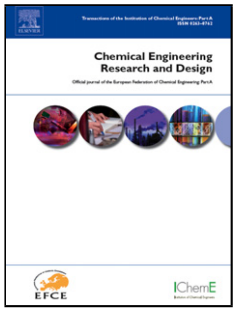

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Experimental evaluation and semi-empirical modeling of a small-capacity reverse osmosis desalination unit

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Highlights

- A performance analysis of a small-capacity reverse osmosis unit is presented
- A semi-empirical model was advanced and validated against experimental data
- A test rig was used to gather data following a 3^3 factorial design
- The feed concentration of salt was found to be the most influencing factor
- An optimal combination of separation and exergy efficiencies was found

ABSTRACT

The present paper carries out a performance assessment of a small-capacity reverse osmosis system. Semi-empirical models to predict the exergy efficiency, the volumetric flow rate of permeate, and the salt rejection as functions of the feed water concentration, and the pump and the membrane characteristics were proposed. An experimental setup was designed and constructed to obtain the key process parameters required for the analysis and validation of the models. Experiments were conducted following a full