An empirical model for build-up of sodium and calcium ions in small scale reverse osmosis

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Abstrak

A simple models for predicting build-up of solute on membrane surface were formulated in this paper. The experiments were conducted with secondary effluent, groundwater and simulated feed water in small-scale of RO with capacity of 2000 L/d. Feed water used in the experiments contained varying concentrations of sodium, calcium, combined sodium and calcium. In order to study the effect of sodium and calcium ions on membrane performance, experiments with
ground water and secondary effluent wastewater were also performed. Build-up of salts on the membrane surface was
calculated by measuring concentrations of sodium and calcium ions in feed water permeate and reject streams using
Atomic Absorption Spectrophotometer (AAS). Multiple linear
regression of natural logarithmic transformation was
used to develop the model based on four main parameters that affect the build-up of solute in a small scale of RO namely applied pressure, permeate flux, membrane resistance, and feed concentration. Experimental data obtained in a small scale RO unit were used to develop the empirical model. The predicted values of theoretical build-up of sodium and calcium on membrane surface were found in agreement with experimental data. The deviation in the prediction of
build-up of sodium and calcium were found to be 1.4 to 10.47 % and 1.12 to 4.46%, respectively.