Performance Evaluation of a Reverse Osmosis System for Optimum Treatment of Brackish Groundwater

***Kanishka[1], N., Ketheesan[2], B. and Thushyanthy[1], M.**

[1]Department of Agricultural Engineering, University of Jaffna, Sri Lanka
[2]Department of Civil Engineering, University of Jaffna, Sri Lanka
*Corresponding E-mail: tkanishka327@gmail.com

Fresh water is limited and increasingly scarce resource due to continuous population growth and industrial development. The water scarcity cannot be eliminated by conservation efforts alone and production of fresh water from alternative sources such as reclaimed waste water, brackish water and ocean water must be considered. Commercially available reverse osmosis (RO) membranes can produce high quality water but improvements on existing RO membranes are needed to determine the optimum operational conditions from the system. Hence the objective of the study was selected as performance evaluation of a reverse osmosis system for optimum treatment of brackish water by changing the recycle flow rate, drain flow rate and antiscalant dosage by estimating RPP (rejection per unit power) and PRP (permeate recovery per unit power. Recycle flow rate was changed between 5-15 Lit/min for five times as 6, 8, 10, 12, and 15 with the constant drain flow rate of 2 Lit/min without antiscalant. Again drain flow rate of the RO plant was changed between 1.5-3.5 Lit/min for five times as 1.5, 2.0, 2.5, 3.0, and 3.5 with 8.5 Lit/min recycle flow rate constantly without antiscalant. Five different antiscalant dosages were selected with the constant value of recycle flow rate and drain flow rate as 9 Lit/min and 1.75 Lit/min respectively. Results revealed that 10 Lit/min of recycle flow rate is showing higher PRP and RPP value and 3 Lit/min of drain flow rate is showing higher PRP and RPP value and 15 to 20 % of antiscalant is showing higher permeate recovery, percentage of rejection and hardness removal. It is expected that operating the RO plant with 10 Lit/min of recycle flow rate and 3 Lit/min of drain flow rate and with 15 to 20 % of antiscalant provide significant reduction in energy cost and also higher recovery rate with optimum recovery with minimum energy consumption.

Key Words: Reverse Osmosis, PRP, Drain flow rate, RPP, Brackish groundwater