# ABSTRACT

Biological Nutrient Removal Systems for Greywater

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Biological nutrient removal from a low-strength greywater is examined through a series of batch and continuous experiments. Contrary to conventional systems, anaerobiosis is not employed and external carbon never supplied. Several observations are made regarding the influence of solids retention time (SRT), hydraulic retention time (HRT), collection time (CT), and substrate availability on nutrient removal from greywater. Under conditions of 5 days SRT using morning samples of greywater, (kitchen greywater dominant) (A.M.), maximum removals of 83% total nitrogen (TN) and 90% total phosphorus (TP) are obtained for the sequencing batch reactor (SBR). Sampling conditions of 5 days SRT × 11 hr HRT using afternoon samples of greywater (laundry greywater dominant) (P.M.) provided optimal nutrient removal (TN – 82%, TP – 100%) using the rotating biological contactor (RBC). A 7 days SRT is the consistent factor, for the activated sludge (AS) reactor, in promoting maximum nutrient removal. The activated sludge/rotating biological contactor combined (AS/RBC) system operates optimally at 5 days SRT. Both systems are capable of producing effluents that easily and consistently meet the Trinidad and Tobago maximum permissible industrial effluent disposal standard for nitrogen; TP effluent concentrations are more variable; however, based on effluent consistency and land limitations, the SBR is the better system for simultaneous biological nutrient removal from greywater in the Caribbean. A simplified batch kinetic model for the prediction of effluent parameter concentration is presented.

**Keywords:** Sequencing batch reactor; Activated sludge reactor; Rotating biological contactor; Solid retention time; Hydraulic retention time; Collection time; Total nitrogen; Total phosphorus; Aerobic/ Anoxic; Greywater.