

ABSTRACT

A Study of the Treatment of Grey Water using a Sequencing Batch Reactor (SBR) and Disinfection using Ultraviolet Radiation

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This study examines the use of a sequencing batch reactor (SBR) for the treatment of greywater, traditionally discharged untreated into receiving streams in Trinidad. Simulated greywater, comprising a fixed ratio of generated kitchen and laundry wastewater was treated using a pilot scale sequencing batch reactor (SBR). The grey water was characterised as a medium to high strength wastewater. The SBR achieved high removal efficiencies of 95.74% for BOD₅, 85.81% for COD, 84.26% for Ammonia and 81.57% for TSS. Performance was marginal for Nitrates and TP with reductions of 17.33% and 14.33% respectively. The effluent of the SBR adequately satisfied the maximum permissible limits for wastewater discharges to inland surface waters. Variation of operating strategies indicated aeration is necessary for nitrification. Anoxic conditions and anaerobic conditions are necessary for denitrification and phosphate removal respectively.

The effectiveness of ultraviolet radiation for disinfection, sourced from the sun and from UV lamps, was investigated. A simplified solar concentrator was used as a means of improving disinfection efficiency for the SODIS method applied to the SBR effluent, river and rain water. This configuration yielded

100% inactivation of both faecal coliform and heterotrophic bacteria after three hours of exposure under sunny conditions for both river and rain water. Under rainy weather conditions, an exposure time greater than six (6) hours would be required for inactivation of the microbial organisms. SODIS was found to be an effective method for achieving drinking water quality standards in terms of microbiological quality and the provision of potable water. It can also be applied throughout the year in Trinidad, with the months of March, April and May being most favourable.

The SBR effluent, river and rain water were also subjected to disinfection using UV lamps. However, this was not found to be an effective method of disinfection with the methodology used in this study, such that, further work is required in this area.

Keywords: Jacque-Ann Grant, greywater, sequencing batch reactor, biological nutrient removal, SODIS, solar disinfection, ultraviolet radiation, UV lamps, solar concentrator.