WATER RECYCLING USING BIOLOGICAL FILTRATION SYSTEM IN INTENSIVE FISH POND SYSTEM IN PARAMETER CHEMICAL OXYGEN DEMAND (COD), PHOSPHATE AND TOTAL SUSPENDED SOLIDS (TSS)

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ABSTRACT

The chemical oxygen demand, total suspended solids and phosphate removal efficiency of sedimentation tank, trickling filter and denitrification tank operated in KUSTEM was studied for wastewater treatment in intensive fish pond system. The filter comprised of three different filter media: the coral sand, coarse gravel and fine gravel. The denitrification tank comprised of bioballs. The aim of this study was to determine the efficient of water recycling that started with or without filtration gave the better performance. The comparison between the removal efficiency of the biological filtration system was determined. The effluent of chemical oxygen demand, total suspended solid and phosphate of these systems were examined to determine the removal efficiency. The results indicated that, the trickling filter gave better performance in the removal of total suspended solids with the percentage of 90.9%. The removal efficiency in phosphate using denitrification tank was 13.8%. The trickling filter was efficient in the removal of chemical oxygen demand with the percentage 47%. The denitrification tank gave better performance in the removal of turbidity with the percentage 41%. The second cycle (25-day filtration and 5-day control continuously) has the removal efficiency of total suspended solids (83.3%), phosphate (27.57%), chemical oxygen demand (80.0%) and turbidity (82.0%). This removal efficiency was affected by chemical factors: pH and dissolved oxygen; physical factors: filter media and filter design and biological factors: metabolism and density of fish and bacteria.

ABSTRAK

Kajian rawatan semula air dari sistem intensif dengan menggunakan sistem penapisan biologi bagi parameter permintaan oksigen kimia, fosfat, jumlah pepejal terampai dan turbiditi yang menggunakan media penapis yang berlainan telah dijalankan di KUSTEM. Sistem penapisan biologi yang dikaji ialah tangki sedimentasi, penapis deraian (*trickling filter*) dan tangki denitrifikasi. Penapis deraian mengandungi tiga jenis media penapis iaitu pasir terumbu karang, batu kelikir halus dan batu kelikir kasar. Dan tangki denitrifikasi mengandungi bebola biologi. Tujuan kajian ini adalah untuk menentukan keberkesanan kitaran air semula tanpa atau dengan menggunakan sistem penapisan biologi akan lebih berkesan. Perbandingan keberkesanan penyingkiran di antara sistem penapisan biologi telah ditentukan. Permintaan oksigen kimia, jumlah pepejal terampai, kepekatan fosfat dan turbiditi dari effluen daripada sistem ini dianalisis untuk menentukan kecekapan penyingkirannya. Keputusan yang diperolehi menunjukkan bahawa penapis deraian memberi kecekapan sebanyak 90% dalam penyingkiran jumlah pepejal terampai. Peratusan kecekapan dalam penyingkiran fosfat untuk tangki denitrifikasi adalah sebanyak 13%. Dan peratusan penyingkiran permintaan oksigen kimia untuk penapis deraian adalah 47%. Tangki denitrifikasi cekap dalam penyingkiran turbiditi dengan peratusan 47.4%. Kitaran kedua memberi kecekapan penyingkiran dalam jumlah pepejal terampai (83.3%), fosfat (27.57%), permintaan oksigen kimia (80.0%) and turbiditi (82.0%). Kecekapan penyingkiran ini mempengaruhi faktor-faktor kimia: pH dan oksigen terlarut; faktor-faktor fizik: media penapis dan reka bentuk penapis serta faktor-faktor biologi: kadar metabolisma dan ketumpatan untuk ikan dan bakteria.