

Mayoritas rumah tangga di perkotaan menggunakan tangki septik sebagai pengolah limbah dari toilet, namun mutu efluen dari tangki septik berpotensi mencemari lingkungan terutama air tanah. Penelitian ini bertujuan untuk merancang, membangun, mengoperasikan serta mengevaluasi IPAL dengan proses lumpur aktif untuk menurunkan kandungan organik air limbah toilet *Wisdom Park* UGM, DI Yogyakarta. Pada kondisi eksisting, air limbah yang berasal dari toilet *Wisdom Park* dialirkan ke dalam tangki septik dan air limpasan dari tangki septik diresapkan ke dalam sumur resapan. Kondisi tersebut dapat berpotensi mencemari air tanah di sekitar area *Wisdom Park*, oleh karena itu efluen dari tangki septik tersebut diperlukan pengolahan lebih lanjut.

IPAL direncanakan menggunakan sistem lumpur aktif dengan debit rencana $0,8 \text{ m}^3/\text{hari}$ dengan volume reaktor tangki aerasi kapasitas 500 liter dan tangki *clarifier* 300 liter. *Starting up* IPAL selama 119 hari tanpa dilakukan *seeding*. Aerasi secara kontinyu menggunakan blower yang dapat menghasilkan debit udara rata-rata 16,454 lpm dan untuk resirkulasi air limbah menggunakan pompa resirkulasi dengan debit rata-rata 4,012 lpm.

IPAL mencapai maksimal penyisihan COD, total N dan PO_4 sebesar 73%, 54%, dan 24%. Kinerja IPAL tidak mencapai target desain dikarenakan kondisi operasional dengan level DO yang rendah (0,4-0,5 mg/l) dan terjadinya sumbatan pada pompa resirkulasi. Namun demikian, IPAL mempunyai potensi mencapai kinerja yang lebih tinggi dengan meningkatkan kapasitas blower, difuser, dan pompa resirkulasi.

Kata kunci: *domestic wastewater, return activated sludge, diffuse aeration, non seeding starting-up*

ABSTRACT

The majority of households in urban areas are using septic tanks to treat waste from their toilets. However, the quality of the effluent from the septic tanks has the potential to contaminate the environment, especially the quality of groundwater. The objectives of this research were to design, build, operate and evaluate Wastewater Treatment Plant (WWTP) with an activated sludge process to reduce the organic matter of wastewater in toilets at UGM Wisdom Park in Yogyakarta. Under existing condition, wastewater from Wisdom Park public toilets was discharged into septic tank, and effluent wastewater from the septic tank flows into the infiltration well. This condition could potentially contaminate groundwater nearby. Thus the effluent from the septic tanks should be further treated.

WWTP was designed with a planned discharge of 0,8 m³/day with two reactors i.e., aeration tank and clarifier tank with the capacity of 500 liters and 300 liters. Starting up for 119 days without seeding. Continuous aeration using a blower that can produce an average airflow rate of 16,454 lpm and wastewater recirculation using submersible pump with average discharge 4,012 lpm.

The system achieve a maximum removal of COD 73%, total Nitrogen 54%, and phosphate 24%. WWTP performance did not achieve the target efficiency due to operational conditions of low level dissolved oxygen (0,4-0,5 mg/l) and frequent clogging of recirculation pump. However the system has potential to reach better performances mainly by increasing the capacity of the blower, diffusers, and recirculation pump.

Keywords: *domestic wastewater, return activated sludge, difuse aeration, non seeding starting-up*