

INTISARI

Menurut hasil pemantauan Badan Lingkungan Hidup Daerah Istimewa Yogyakarta, kualitas *effluent* 41 dari 376 Instalasi Pengolahan Air Limbah (IPAL) komunal yang tersebar di 4 kabupaten dan kota Yogyakarta masih belum memenuhi baku mutu Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor 68 Tahun 2016 tentang Baku Mutu Limbah Domestik. IPAL komunal yang dibangun pemerintah tersebut menggunakan sistem pengolahan *Anaerobic Baffled Reactor* (ABR). Penelitian ini bertujuan untuk merancang, membangun, mengoperasikan serta mengevaluasi IPAL dengan proses baru yaitu lumpur aktif dan aerasi secara *intermittent* untuk menurunkan kandungan organik air limbah toilet/kamar mandi umum *Wisdom Park* UGM.

IPAL yang direncanakan menggunakan sistem lumpur aktif dengan komponen aerator berupa pompa celup dan *microbubble generator* (MBG) tipe *porous pipe* dan *orifice* sebagai *nozzle* nya. Aerasi dilakukan secara *intermittent* guna menciptakan kondisi aerob-anoksik untuk menurunkan kandungan organik air limbah.

Hasil dari perancangan yaitu unit-unit IPAL dibangun dari tangki air HDPE 500 liter dan 300 liter dengan debit rencana 0,8 m³/hari. Penggunaan MBG sebagai aerator dapat meningkatkan konsentrasi oksigen terlarut sebesar 3,2 mg/L. *Starting-up* IPAL selama 9 minggu dengan variasi waktu *on-off* aerasi 3 jam : 1 jam menghasilkan efisiensi penghilangan COD dan TSS maksimum 66,102 % dan 56,25% sehingga ada potensi untuk menghasilkan kualitas *effluent* yang memenuhi baku mutu Peraturan Gubernur Daerah Istimewa Yogyakarta Nomor 7 Tahun 2016 tentang Baku Mutu Limbah Cair Kegiatan IPAL Domestik Komunal maupun Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor 68 Tahun 2016 tentang Baku Mutu Limbah Domestik.

Kata kunci: *microbubble generator, aerasi intermittent, return activated sludge*

ABSTRACT

Based on results of the monitoring held by BLH DIY, effluent quality 41 of 376 Communal wastewater treatment plant (WWTP) spread in 4 districts and the city of Yogyakarta still not meet the quality standards according to Minister of Environment and Forestry Regulation 68/2016 about Quality Standards of Domestic Waste. Communal WWTP that government built, used Anaerobic Baffled Reactor (ABR). This research aims to design, build, operate and evaluate the WWTP with new process of activated sludge and intermittent aeration to lower organic content of waste water of the Wisdom Park's public toilet.

WWTP was planned using activated sludge system with submersible pump and porous pipe, orifice type microbubble generator (MBG) as the nozzle for aerator. Then aerated intermittently in order to create the conditions for aerobic-anoxic to lower the content of organic material in the wastewater.

The result of the design is that each unit of WWTP was built from 500 liters and 300 liters HDPE water tank with planned discharge of 0,8 m³ per day. Results show that the use of MBG as aerator can increase the Dissolved Oxygen concentration of 3,2 mg/L. Starting-up the WWTP for 9 weeks with on-off aeration time variation of 3 hour : 1 hour, gets maximum efficiency of COD removal 66,102% and maximum efficiency of TSS removal 56,25% so there is prospect to produce effluent quality that meets the quality standards according to Governor of DIY Regulation 7 /2016 about Quality Standards of Domestic Liquid Waste Activities Communal WWTP and also Minister of Environment and Forestry Regulation 68/2016 about Quality Standards of Domestic Waste.

Keywords: *microbubble generator, intermittent aeration, return activated sludge*