

Studi skala laboratorium aplikasi pretreatment air baku IPAM menggunakan biofilter tercelup spongebed teraerasi: studi kasus: Sungai Pesanggrahan = Laboratory scale study of raw water pretreatment technology application for drinking water installation using aerated submerged spongebed biofilter: case study: raw water from Pesanggrahan River

Margareta Novia Asih Christami, author

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Abstrak

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Pencemaran domestik telah menyebabkan kontaminasi terhadap air Sungai Pesanggrahan. Pengolahan kimia sebagai reaksi untuk menurunkan polutan menghasilkan byproduct berupa limbah B3 yang mahal pengolahannya dan berpotensi mencemari lingkungan. Tingginya pencemaran air Sungai Pesanggrahan berupa TSS 11,1 ndash; 243,8 mg/L, COD 17,8-165,2 mg/L, Total Fosfat 0,12-0,74 mg/L, dan NH<sub>3</sub>-N 0,094-1,04 mg/L telah melampaui syarat mutu Kelas I air baku air minum berdasarkan PP No. 82 Tahun 2001. Oleh karenanya, pengolahan biologis Aerated Submerged SpongeBed Biofilter dapat dijadikan rekomendasi pretreatment proses IPAM karena sifat ramah lingkungan dan kemampuan mereduksi beban pencemar organik dengan baik. Untuk mereduksi beban organik tersebut, dilakukan pendekatan skala lab dengan modifikasi 15 media dalam reaktor bervolume 6 L dengan suplai udara 7 L/menit. Variasi waktu tinggal ditinjau pada 1; 1,5; 2 jam. Didapatkan bahwa removal tertinggi terjadi pada waktu retensi 1,5 jam dengan kemampuan reduksi 75,5 0,12 TSS; 59,1 0,14 COD; 57,1 0,27 Total Fosfat; dan 45,5 0,37 NH<sub>3</sub>-N. Penurunan ammonia berlangsung pada orde nol dengan koefisien 0,005 g/m<sup>2</sup>-hari pada HRT optimumnya: 1,5 jam. Efek setelah pengolahan juga ditinjau menggunakan Jartest dan ditemukan bahwa pengolahan biofilter spongebed mampu menurunkan kebutuhan dosis koagulan optimum PAC dari sekitar 50 mg/L menjadi 5 mg/L. Kekeuhan dan COD pun mampu diturunkan dari 135 NTU menjadi sekitar 0,5 NTU dan dari 33 mg/L menjadi 14 mg/L.

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**ABSTRACT**

The domestic source has caused contamination into Pesanggrahan River water. Chemical treatment as a reaction to decrease this pollutant produces by products in the form of Toxic and Hazardous Wastes which are both expensive to process and have high potential to pollute the environment. High contamination of Pesanggrahan River such as TSS 11.1-243.8 mg L, COD 17.8-165.2 mg L, Total Phosphate 0.12-0.74 mg L, and NH<sub>3</sub> N 0.094 ndash 1.04 mg L has exceeded the standard of Class I Raw Water for Drinking Water based on Government Regulation Number 82 Year 2001. Therefore, the biological treatment using Aerated Submerged Spongebed Biofilter can be proposed as a pretreatment recommendation for Drinking Water Treatment Plant processing due to its environmental friendly property and its ability to reduce the organic pollutant really well. To see the implementation of organic load reduction, a lab scale experiment with a modified volume of 15 media was applied in a 6L reactor with 7 L min oxygen supply. Variations of retention time were evaluated at 1 1,5 2 hours. It was found that the highest removal efficiency occurred at HRT 1,5 hours with the reduction capability of 75.5 0.12 TSS 59.1 0.14 COD 57.1 0.27 Total Phosphate and

45.5 0.37 NH<sub>3</sub> N. Ammonia reduction obtained at zero order reaction with the coefficient of 0.005 g m<sup>2</sup>day on its most optimum hydraulic retention time 1,5 hours. The post treatment effects were also reviewed using Jartest. It was found that the spongebed biofilter was able to decrease the need for optimum coagulant dose or PAC from around 50 mg L to 5 mg L. Turbidity and COD could also be derived from 135 NTU to around 0.4 NTU, and from 33 mg L to 14 mg L.