

Abstrak

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**VARIASI WAKTU TINGGAL *BIOFILTER* SECARA AEROB DALAM
PENURUNAN KADAR BOD (*Biological Oxygen Demand*) LIMBAH CAIR
INDUSTRI PT. POPYRUS SAKTI PAPER MILL**

xii + 75 Halaman + 13 Tabel + 5 Gambar + 7 Lampiran

PT. Papyrus Sakti Paper Mill merupakan salah satu Industri Pulp dan Kertas yang bergerak dibidang pembuatan kertas dari kegiatan produksi ini menghasilkan buangan berupa limbah cair. Limbah cair di PT. Papyrus Sakti Paper Mill megandung kadar *Biological Oxygen Demand* (BOD) yang relatif tinggi sehingga berpotensi mencemari lingkungan. Metode yang digunakan dalam penurunan kadar BOD limbah cair yaitu Biofilter secara aerob. Biofilter digunakan untuk menurunkan kadar BOD limbah cair karena biofilter merupakan pengolahan limbah secara biologis dimana senyawa organik pada limbah cairakan terdifusi ke dalam lapisan atau film biologis yang melekat pada permukaan media biofilter dengan oksigen yang terlarut dalam limbah cair senyawa organik tersebut akan diuraikan oleh mikroorganisme yang ada di lapisan biofilm dan energi yang dihasilkan akan diubah menjadi biomassa.

Tujuan dari penelitian ini adalah Mengetahui variasi waktu tinggal *biofilter* secara aerob dalam penurunan kadar BOD (*Biological Oxygen Demand*) limbah cair Industri di PT. Papyrus Sakti Paper Mill. Jenis Penelitian adalah eksperimen dengan desain penelitian pre-test, post-test without control. Teknik pengambilan sampel penelitian adalah grab sampling dengan jumlah pengulangan 6 kali. Jumlah sampel yang digunakan pada penelitian ini adalah sebesar 2.214,12 liter. Penelitian ini menganalisis variasi waktu tinggal biofilter secara aerob dalam penurunan kadar BOD dengan variasi waktu 4 jam, 5 jam dan 6 jam. Rata – rata kadar BOD sebelum perlakuan adalah 114,2 mg/l. Rata-rata Kadar BOD setelah diberi perlakuan pada waktu tinggal 4 jam sebesar 77,96 mg/l (32,57%), waktu tinggal 5 jam sebesar 58,54 mg/l (49,40%), dan waktu tinggal 6 jam sebesar 39,69 mg/l (65,69%). Waktu tinggal yang paling berbeda bermakna dalam menurunkan kadar BOD limbah cair yaitu 6 jam. Hasil uji one way anova menunjukkan nilai P value $0,000 < \alpha (0,05)$ artinya terdapat perbedaan waktu tinggal biofilter aerob terhadap penurunan kadar BOD limbah cair. disarankan untuk menambah waktu pada proses *seeding* mikroorganisme.

Daftar Pustaka: 27 (1996 - 2020)

Kata Kunci : Limbah Cair, *Biological Oxygen Demand* (BOD), *Biofilter*, Waktu tinggal, *bioball*

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Abstract

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**VARIATION IN DETENTION TIME USED IN AEROBIC BIOFILTER FOR
REDUCTION OF BOD (BIOLOGICAL OXYGEN DEMAND) INDUSTRIAL
WASTEWATER PT. POPYRUS SAKTI PAPER MILL**

xii + 75 Pages + 13 Tables + 5 Images + 7 Attachments

PT. Papyrus Sakti Paper Mill is one of the Pulp and Paper Industries engaged in the manufacture of paper from this production activity which produces waste in the form of liquid waste. Liquid waste at PT. Papyrus Sakti Paper Mill contains relatively high levels of Biological Oxygen Demand (BOD) that has the potential to pollute the environment. The method used in reducing BOD levels of liquid waste is aerobic biofilter. Biofilters are used to reduce BOD levels of liquid waste because biofilters are biological waste treatment where organic compounds in liquid waste will diffuse into a biological layer or film attached to the surface of the biofilter media with dissolved oxygen in the liquid waste, the organic compounds will be decomposed by microorganisms that present in the biofilm layer and the energy produced will be converted into biomass.

The purpose of this study was to determine the variation of aerobic biofilter residence time in reducing BOD (Biological Oxygen Demand) levels of industrial wastewater at PT. Papyrus Sakti Paper Mill. This type of research is an experimental research design with pre-test, post-test without control. The research sampling technique was grab sampling with a total of 6 repetitions. The number of samples used in this study was 2,214.12 liters. This study analyzed the variation of aerobic biofilter detention time in decreasing BOD levels with variations in time of 4 hours, 5 hours, and 6 hours. The average BOD level before treatment was 114.2 mg/l. The average BOD level after being treated at detention time of 4 hours was 77.96 mg/l (32.57%), detention time of 5 hours was 58.54 mg/l (49.40%), and detention time of 6 hours of 39.69 mg/l (65.69%). The most significant difference in detention time in reducing BOD levels of liquid waste is 6 hours. The results of the one-way ANOVA test show that the P-value is $0.000 < (0.05)$ meaning that there is a difference in detention time of the aerobic biofilter on the decrease in BOD levels of liquid waste. It is recommended to increase the time for the microorganism seeding process.

References : 27 (1996 - 2020)

Key Words : *Wastewater, Biological Oxygen Demand (BOD), Biofilter, Detention Time, bioball*