

KARAKTERISTIK *EFFLUENT* LIMBAH CAIR INDUSTRI TAHU DAN EVALUASI PERFORMA PENGOLAHANNYA MENGGUNAKAN BIODIGESTER-IPAL DI DESA SAMBAK, KABUPATEN MAGELANG, PROVINSI JAWA TENGAH

INTISARI

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Limbah cair tahu mengandung bahan organik yang tinggi *Biological Oxygen Demand* (BOD) antara 5000-10.000 mg/L, *Chemical Oxygen Demand* (COD) kisaran 7000-12000 mg/L dan rata-rata pH bernilai 4-5. Adapun baku mutu air limbah pengolahan tahu yaitu BOD sebesar 150 mg/L, COD senilai 300 mg/L, dan pH antara 6-9. Apabila BOD, COD, dan pH tidak memenuhi baku mutu dapat mengakibatkan kerusakan ekosistem perairan dan kesuburan tanah pertanian menurun. Penelitian ini memiliki tujuan yaitu 1) mengidentifikasi spesifikasi biodigester, 2) menganalisis karakteristik *effluent* limbah cair tahu dengan dan tanpa pengolahan biodigester-IPAL, 3) menganalisis uji signifikansi karakteristik *effluent* limbah cair industri tahu tanpa dan hasil biodigester-IPAL, 4) mengevaluasi performansi pengolahan biodigester-IPAL, dan 5) mengidentifikasi faktor yang dapat mempengaruhi pengolahan limbah cair tahu melalui biodigester-IPAL. Penelitian ini dilakukan di Desa Sambak, Kabupaten Magelang dari bulan Januari-April 2023. Parameter yang digunakan diantaranya pH, suhu, *Dissolved Oxygen* (DO), BOD, COD, *Total Suspended Solid* (TSS), *Total Dissolved Solid* (TDS), nitrat dan fosfat. Hasil penelitian menunjukkan bahwa biodigester di Desa Sambak memiliki bentuk *fixed dome* dengan pengisian secara kontinyu. Hasil pH, suhu, DO, BOD, COD, TSS, TDS, nitrat, dan fosfat *effluent* limbah cair industri tahu dengan dan tanpa biodigester-IPAL memiliki rentang nilai secara berurutan sebesar 2,38-5,31; 24,29-34,50°C; 0,60-4,45 mg/L; 1290-3925 mg/L; 2547,00-8672,50 mg/L; 108-392 mg/L; 2070-4632 mg/L; 66,90-133,96 mg/L; dan 2,29-25,78 mg/L. Uji signifikansi menunjukkan pengolahan menggunakan biodigester-IPAL memberikan pengaruh yang signifikan terhadap perubahan kualitas limbah cair industri tahu berdasarkan parameter pH, suhu, DO, BOD, COD, TSS, TDS, nitrat, dan fosfat. Biodigester-IPAL 2 memiliki performansi pengolahan yang terbaik. Faktor yang dapat mempengaruhi performansi biodigester-IPAL yaitu waktu tinggal, kandungan limbah cair industri tahu, sisa pengolahan sebelumnya, pengendapan, dan peran mikroorganisme.

Kata kunci: limbah cair tahu, biodigester, IPAL, performa

**CHARACTERISTICS OF WASTEWATER TOFU INDUSTRY EFFLUENT
AND PROCESSING PERFORMANCE EVALUATION USING
BIODIGESTER-WWTP IN SAMBAK VILLAGE, MAGELANG DISTRICT,
CENTRAL JAVA PROVINCE**

ABSTRACT

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Wastewater from tofu production contains high levels of Biological Oxygen Demand (BOD), ranging from 5000-10,000 mg/L, Chemical Oxygen Demand (COD) ranging from 7000-12,000 mg/L, and an average pH value of 4-5. The standard for wastewater treatment of tofu processing includes a BOD limit of 150 mg/L, COD limit of 300 mg/L, and pH range of 6-9. Failure to meet these standards can result in damage to aquatic ecosystems and a decrease in agricultural soil fertility. This study aimed to: 1) identify biodigester specifications, 2) analyze the characteristics of tofu wastewater effluent with and without biodigester-wastewater treatment plant (WWTP) treatment, 3) analyze the significance test of the characteristics of tofu wastewater effluent without and with biodigester-WWTP treatment, 4) evaluate the performance of the biodigester-WWTP treatment, and 5) identify factors that can affect the treatment of tofu wastewater through biodigester-WWTP. This research was conducted in Sambak Village, Magelang Regency from January to April 2023. The research results showed that the biodigester in Sambak Village has a fixed dome shape with continuous feeding. The results of pH, temperature, DO, BOD, COD, TSS, TDS, nitrate, and phosphate of wastewater tofu effluent with and without biodigester-WWTP treatment have a were range of 2.38-5.31; 24.29-34.50°C; 0.60-4.45 mg/L; 1290-3925 mg/L; 2547.00-8672.50 mg/L; 108-392 mg/L; 2070-4632 mg/L; 66.90-133.96 mg/L; and 2.29-25.78 mg/L, respectively. The significance test indicate that the treatment using biodigester-WWTP has a significant effect on the parameters of pH, temperature, DO, BOD, COD, TSS, TDS, nitrate, and phosphate of wastewater tofu industry. Biodigester-WWTP 2 has the best treatment performance. Factors that can affect the performance of biodigester-WWTP include optimization time, the content of tofu wastewater, previous treatment residues, sedimentation, and the role of microorganisms.

Keywords: Wastewater tofu, biodigester, WWTP, performance