

ABSTRAK

Pemanfaatan Limbah Cair Tahu Sebagai Substrat Biogas Serta Analisis Penurunan Beban Organik (COD Dan BOD) Melalui Fermentasi Anaerob

(Salsa Fitri Anatasya, 2026, 34 halaman, 12 tabel, 8 gambar, 4 lampiran)

Limbah cair tahu memiliki kandungan bahan organik yang tinggi sehingga berpotensi mencemari lingkungan, namun juga dapat dimanfaatkan sebagai bahan baku biogas melalui fermentasi anaerob. Penelitian ini bertujuan untuk mengetahui pengaruh variasi konsentrasi *Effective Microorganisms-4* (EM-4) terhadap perubahan *Chemical Oxygen Demand* (COD) dan *Biological Oxygen Demand* (BOD), pengaruh konsentrasi EM-4 dan waktu fermentasi terhadap produksi biogas (CH_4), serta hubungan perubahan COD dan BOD terhadap produksi biogas. Penelitian menggunakan variasi konsentrasi EM-4 sebesar 3, 6, 9, 12, dan 15% dengan waktu fermentasi 5–25 hari. Parameter yang dianalisis meliputi COD, BOD, dan kandungan CH_4 menggunakan *Gas Analyzer*. Hasil penelitian menunjukkan bahwa penurunan COD terbesar diperoleh pada konsentrasi EM-4 6% sebesar 18,23%, sedangkan penurunan BOD terbesar pada konsentrasi EM-4 9% sebesar 55,49%. Produksi CH_4 tertinggi diperoleh pada konsentrasi EM-4 9% dengan waktu fermentasi 25 hari, yaitu sebesar 9.807 ppm. Analisis hubungan menunjukkan bahwa perubahan BOD memiliki hubungan yang lebih kuat terhadap produksi CH_4 dibandingkan perubahan COD, dengan nilai koefisien determinasi (R^2) masing-masing sebesar 0,9510 dan 0,5973. Dengan demikian, konsentrasi EM-4 9% dengan waktu fermentasi 25 hari merupakan kondisi terbaik untuk menghasilkan biogas dari limbah cair tahu.

Kata kunci: Biogas, BOD, COD, *Effective Microorganisms-4* (EM-4), Fermentasi Anaerob, Limbah Cair Tahu

ABSTRACT

Utilization of Tofu Wastewater as a Biogas Substrate and Analysis of Organic Load Reduction (COD and BOD) through Anaerobic Fermentation

(Salsa Fitri Anatasya, 2026, 34 pages, 12 tables, 8 images, 4 appendices)

Tofu wastewater contains a high concentration of organic matter that has the potential to cause environmental pollution. However, it can also be utilized as a substrate for biogas production through anaerobic fermentation. This study aimed to determine the effect of Effective Microorganisms-4 (EM-4) concentration on the changes in Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD), to evaluate the effect of EM-4 concentration and fermentation time on biogas (CH₄) production, and to analyze the relationship between COD and BOD reduction and biogas production. The experiment employed EM-4 concentrations of 3%, 6%, 9%, 12%, and 15% with fermentation periods ranging from 5 to 25 days. The analyzed parameters included COD, BOD, and CH₄ concentration measured using a Gas Analyzer. The results showed that the highest COD reduction was achieved at an EM-4 concentration of 6%, reaching 18.23%, while the highest BOD reduction was obtained at an EM-4 concentration of 9%, reaching 55.49%. The highest CH₄ production was obtained at an EM-4 concentration of 9% with a fermentation period of 25 days, reaching 9,807 ppm. Correlation analysis indicated that BOD reduction had a stronger relationship with CH₄ production than COD reduction, with coefficients of determination (R^2) of 0.9510 and 0.5973, respectively. Therefore, an EM-4 concentration of 9% with a fermentation period of 25 days was identified as the optimum condition for producing biogas from tofu wastewater.

Keywords: Anaerobic Fermentation, Biogas, BOD, COD, Effective Microorganisms-4 (EM-4), Tofu Wastewater.