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Evaluasi kinerja instalasi pengolahan air limbah portabel (membran mikrofiltrasi) di upt puskesmas rawat inap Kemiling Kota Bandar Lampung tahun 2025

xii + 47 halaman, 5 tabel, 8 gambar, dan lampiran

ABSTRAK

Instalasi Pengolahan Air Limbah (IPAL) memiliki peranan penting dalam menjaga kualitas lingkungan dan kesehatan masyarakat, terutama di fasilitas pelayanan kesehatan seperti Puskesmas. Penelitian ini bertujuan untuk mengevaluasi kinerja IPAL portabel berbasis teknologi membran mikrofiltrasi di UPT Puskesmas Rawat Inap Kemiling, Kota Bandar Lampung, pada tahun 2025. Evaluasi dilakukan melalui analisis kualitas air limbah sebelum dan sesudah pengolahan berdasarkan parameter fisik, kimia, dan mikrobiologis, serta observasi terhadap lamanya waktu jenuh (*fouling*) membran mikrofiltrasi.

Metode penelitian yang digunakan adalah deskriptif kuantitatif dengan pengumpulan data melalui uji laboratorium dan pemantauan debit air limbah selama periode Februari hingga Mei 2025.

Hasil penelitian menunjukkan bahwa IPAL portabel mampu menurunkan kadar polutan seperti TSS, COD, amonia, dan total coliform hingga memenuhi baku mutu lingkungan, meskipun parameter BOD masih sedikit melebihi ambang batas. Debit air limbah menunjukkan tren penurunan yang signifikan akibat kejenuhan membran, dengan waktu jenuh terdeteksi setiap kurang lebih tiga bulan. Persamaan regresi menunjukkan hubungan negatif yang signifikan antara debit air dan waktu jenuh membran. Fouling terbukti berdampak pada penurunan efisiensi sistem, peningkatan tekanan operasional, serta potensi gangguan dalam pengolahan air limbah.

Penelitian ini menyimpulkan bahwa teknologi membran mikrofiltrasi efektif dalam meningkatkan kualitas air limbah, namun memerlukan manajemen fouling yang baik untuk menjaga kinerja optimal. Rekomendasi teknis seperti jadwal pembersihan membran dan monitoring debit secara berkala sangat diperlukan guna memastikan keberlanjutan operasional IPAL di fasilitas kesehatan.

Kata kunci: IPAL portabel, membran mikrofiltrasi, air limbah medis, fouling membran, kualitas air, UPT Puskesmas Kemiling

Daftar bacaan: 19 (2002-2023)

**TANJUNG KARANG HEALTH POLYTECHNIC
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PROGRAM APPLIED BACHELOR PROGRAM**

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*Performance Evaluation of Portable Wastewater Treatment Installation
(Microfiltration Membrane) at the Kemiling Inpatient Health Center UPT Bandar
Lampung City, 2025*

xii + 47 pages, 5 tables, 8 figures, and appendices

ABSTRACT

Wastewater Treatment Plants (WWTPs) play a vital role in maintaining environmental quality and public health, especially in healthcare facilities such as public health centers. This study aims to evaluate the performance of a portable WWTP utilizing microfiltration membrane technology at the UPT Inpatient Public Health Center Kemiling, Bandar Lampung City, in 2025. The evaluation was carried out by analyzing the wastewater quality before and after treatment based on physical, chemical, and microbiological parameters, along with observations on membrane fouling saturation time.

The research method used was quantitative descriptive, with data collected through laboratory tests and wastewater flow monitoring during the period from February to May 2025.

The results showed that the portable WWTP was capable of reducing pollutants such as TSS, COD, ammonia, and total coliform to meet environmental quality standards, although the BOD parameter slightly exceeded the threshold. Wastewater discharge showed a significant downward trend due to membrane fouling, with saturation occurring approximately every three months. Regression analysis indicated a significant negative correlation between water discharge and membrane saturation time. Fouling was found to impact system efficiency, increase operational pressure, and potentially disrupt the wastewater treatment process.

This study concludes that microfiltration membrane technology is effective in improving wastewater quality, but requires proper fouling management to maintain optimal performance. Technical recommendations such as membrane cleaning schedules and regular discharge monitoring are essential to ensure the sustainable operation of WWTPs in healthcare facilities.

Keywords: portable WWTP, microfiltration membrane, medical wastewater, membrane fouling, water quality, UPT Kemiling Health Center

References: 19 (2002–2023)