

Intisari

Proses pencucian tanah dapat mengatasi pencemaran minyak bumi, namun masih menghasilkan fraksi cair yang mengandung hidrokarbon. Bioremediasi dengan bantuan mikroba menjadi alternatif ramah lingkungan dalam menurunkan kadar hidrokarbon dalam fraksi cair. Penelitian ini bertujuan untuk mengetahui kemampuan mikroba dalam mendegradasi hidrokarbon dalam fraksi cair hasil pencucian tanah. Mikroba dalam penelitian ini menggunakan konsorsium mikroba dari lumpur Instalasi Pengolahan Air Limbah (IPAL). Penggunaan lumpur dipilih karena mengandung berbagai komunitas bakteri yang dapat mendegradasi hidrokarbon yang diharapkan dapat mendegradasi hidrokarbon rantai panjang dalam minyak bumi. Pada penelitian ini, air limbah yang mengandung hidrokarbon minyak bumi diperoleh melalui proses ekstraksi tanah tercemar minyak bumi menggunakan pertalite, diikuti oleh pencucian menggunakan *sodium dodecyl sulfate* (SDS). Limbah cair tersebut diberikan empat jenis perlakuan, yaitu: A (kontrol tanpa penambahan), AU (dengan penambahan urea), AS (dengan penambahan lumpur), dan AUS (dengan penambahan urea dan lumpur). Inkubasi selama 6 minggu dilakukan dengan pemberian aerasi selama inkubasi. Perhitungan *Total Petroleum Hydrocarbons* (TPH) dilakukan setiap 2 minggu. Hasil penelitian menunjukkan bahwa penambahan lumpur (AS) memiliki TPH lebih rendah dibandingkan dengan kontrol. Sedangkan, perlakuan penambahan urea (AU) memiliki nilai TPH yang lebih tinggi dibandingkan dengan Kontrol. Akan tetapi perbedaan yang ditunjukkan tidak signifikan berdasarkan uji varians dua arah. Hasil tersebut membuktikan bahwa baik penambahan lumpur IPAL dan urea tidak memberikan efek signifikan dalam mengurangi nilai TPH dibandingkan dengan kontrol.

Kata kunci: biodegradasi, limbah cair, lumpur, minyak bumi

Abstract

Soil washing is one method used to address petroleum contamination, but it still produces a liquid fraction containing hydrocarbons. Bioremediation with microbial assistance offers an environmentally friendly alternative to reduce hydrocarbon levels in the aqueous fraction. This study aims to evaluate the ability of microorganisms to degrade hydrocarbons in the liquid fraction resulting from soil washing. The microorganisms used in this study were a microbial consortium derived from sludge obtained from a Wastewater Treatment Plant (WWTP). Sludge was selected due to its diverse bacterial communities capable of degrading hydrocarbons, particularly long-chain hydrocarbons found in crude oil. In this study, oily wastewater was obtained through an extraction process using pertalite (RON 90) on crude oil-contaminated soil, followed by washing with sodium dodecyl sulfate (SDS). The resulting liquid waste was subjected to four treatments: A (control without additives), AU (with urea addition), AS (with sludge addition), and AUS (with both urea and sludge). Incubation was carried out for six weeks with continuous aeration. Total Petroleum Hydrocarbon (TPH) levels were measured every two weeks. The results showed that the sludge treatment (AS) had lower TPH levels compared to the control. In contrast, the urea treatment (AU) resulted in higher TPH levels than the control. However, the differences observed were not statistically significant based on two-way analysis of variance. These findings indicate that neither the addition of WWTP sludge nor urea had a significant effect in reducing TPH levels compared to the control.

Keyword: sludge, biodegradation, crude oil, wastewater