

**BIODEGRADASI SENYAWA HIDROKARBON
MENGUNAKAN BAKTERI HIDROKARBONOKLASTIK
DARI TANAH TERCEMAR OLI BENGKEL DALAM UPAYA
BIOREMEDIASI**

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ABSTRAK

Pencemaran tanah akibat limbah oli bengkel merupakan salah satu permasalahan lingkungan karena mengandung senyawa hidrokarbon yang bersifat toksik dan sulit terdegradasi secara alami. Salah satu alternatif penanganannya adalah melalui bioremediasi menggunakan bakteri hidrokarbonoklastik *indigenous* yang telah beradaptasi pada lingkungan tercemar. Penelitian ini bertujuan untuk mengisolasi bakteri hidrokarbonoklastik dari tanah tercemar oli bengkel, menguji kemampuan degradasi hidrokarbon, serta mengetahui efektivitas biodegradasinya dalam menurunkan kadar *Total Petroleum Hydrocarbon* (TPH). Penelitian dilakukan melalui tahapan isolasi bakteri menggunakan media *Bushnell-Haas* (BH) yang ditambahkan 1% oli, karakterisasi isolat, skrining awal menggunakan indikator 2,6-*dichlorophenolindophenol* (DCPIP), dan uji biodegradasi selama 30 hari. Parameter yang diamati meliputi pertumbuhan bakteri, pengukuran pH, dan penurunan kadar TPH. Hasil penelitian menunjukkan bahwa diperoleh lima isolat bakteri hidrokarbonoklastik (IH-1, IH-2, IH-3, IH-4, dan IH-5). Berdasarkan uji DCPIP, isolat IH-2 dan IH-5 menunjukkan kemampuan degradasi tercepat dengan perubahan warna media dari biru menjadi bening pada hari ke-2. Selama proses biodegradasi, kedua isolat mampu tumbuh menggunakan oli sebagai satu-satunya sumber karbon dan menyebabkan penurunan pH medium. Analisis TPH menunjukkan bahwa isolat IH-2 mampu menurunkan kadar TPH sebesar 6,70%, sedangkan isolat IH-5 menunjukkan efektivitas tertinggi dengan penurunan sebesar 10,10% setelah inkubasi selama 30 hari. Hasil penelitian ini menunjukkan bahwa bakteri hidrokarbonoklastik *indigenous* dari tanah tercemar oli bengkel memiliki potensi sebagai agen bioremediasi, dengan isolat IH-5 sebagai isolat terbaik dalam mendegradasi senyawa hidrokarbon.

Kata kunci: bakteri, hidrokarbonoklastik, biodegradasi, bioremediasi, oli.

ABSTRACT

Soil contamination caused by waste engine oil from motorcycle workshops is one of the environmental problems due to the presence of toxic hydrocarbon compounds that are difficult to degrade naturally. One alternative approach to overcome this problem is bioremediation using indigenous hydrocarbonoclastic bacteria that have adapted to contaminated environments. This study aimed to isolate hydrocarbonoclastic bacteria from soil contaminated with waste engine oil, evaluate their hydrocarbon degradation ability, and determine the effectiveness of biodegradation in reducing Total Petroleum Hydrocarbon (TPH) levels. The study was conducted through bacterial isolation using Bushnell-Haas (BH) medium supplemented with 1% waste engine oil, isolate characterization, preliminary screening using 2,6-dichlorophenolindophenol (DCPIP) as an indicator, and a 30-day biodegradation test. The observed parameters included bacterial growth, pH changes, and TPH reduction. The results showed that five hydrocarbonoclastic bacterial isolates (IH-1, IH-2, IH-3, IH-4, and IH-5) were successfully isolated. Based on the DCPIP screening, isolates IH-2 and IH-5 exhibited the fastest hydrocarbon degradation activity, as indicated by the color change of the medium from blue to colorless on the second day. During the biodegradation process, both isolates were able to grow using waste engine oil as the sole carbon source and caused a decrease in the pH of the medium. TPH analysis showed that isolate IH-2 reduced TPH levels by 6.70%, whereas isolate IH-5 exhibited the highest degradation efficiency with a TPH reduction of 10.10% after 30 days of incubation. These findings indicate that indigenous hydrocarbonoclastic bacteria isolated from soil contaminated with waste engine oil have the potential to be used as bioremediation agents, with isolate IH-5 identified as the most effective isolate for degrading hydrocarbon compounds.

Keywords: bacteria, hydrocarbonoclastic, biodegradation, bioremediation, oil.