

## Isolation of asphaltene-degrading bacteria from sludge oil

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### Abstrak

Sludge oil contains 30% ?50% hydrocarbon fractions that comprise saturated fractions, aromatics, resins, and asphaltene. Asphaltene fraction is the most persistent fraction. In this research, the indigenous bacteria that can degrade

asphaltene fractions from a sludge oil sample from Balikpapan that was isolated using BHMS medium (Bushnell-Hass

Mineral Salt) with 0.01% (w/v) yeast extract, 2% (w/v) asphaltene extract, and 2% (w/v) sludge oil. The ability of the

four isolates to degrade asphaltene fractions was conducted by the biodegradation asphaltene fractions test using liquid

cultures in a BHMS medium with 0.01% (w/v) yeast extract and 2% (w/v) asphaltene extract as a carbon source. The

parameters measured during the process of biodegradation of asphaltene fractions include the quantification of Total

Petroleum Hydrocarbon (g), log total number of bacteria (CFU/ml), and pH. There are four bacteria (isolates 1, 2, 3, and

4) that have been characterized to degrade asphaltic fraction and have been identified as *Bacillus* sp.

*Lysinibacillus*

*fusiformes*, *Acinetobacter* sp., and *Mycobacterium* sp., respectively. The results showed that the highest ability to

degrade asphaltene fractions is that of *Bacillus* sp. (isolate 1) and *Lysinibacillus fusiformes* (Isolate 2), with biodegradation percentages of asphaltene fractions being 50% and 55%, respectively, and growth rate at the exponential

phase is  $7.17 \times 10^7$  CFU/mL.days and  $4.21 \times 10^7$  CFU/mL.days, respectively.

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Isolasi Bakteri Pendegradasi Fraksi Aspaltik dari Lumpur Minyak Bumi. Lumpur minyak bumi mengandung 30%-50% fraksi hidrokarbon yang terdiri dari fraksi jenuh, aromatik, resin, dan aspaltik. Fraksi aspaltik merupakan

fraksi yang paling sulit didegradasi. Pada penelitian ini, bakteri pendegradasi fraksi aspaltik merupakan bakteri

indigenos yang diisolasi dari sampel lumpur minyak bumi di Balikpapan dengan menggunakan media Bushnell-Hass

Mineral Salt (BHMS) dengan 0.01% (b/v) ekstrak ragi, 2% (b/v) ekstrak fraksi aspaltik, dan 2% (b/v) lumpur minyak

bumi. Kemampuan isolat mendegradasi fraksi aspaltik diuji menggunakan media BHMS yang ditambahkan 0.01% (b/v)

ekstrak ragi dan 2% (b/v) ekstrak fraksi aspaltik sebagai sumber karbon. Selama uji biodegradasi dilakukan pengukuran parameter yaitu Total Petroleum Hydrocarbon (g), jumlah total bakteri (CFU/mL), dan pH. Empat isoat bakteri (isolat 1,2,3, dan 4) yang telah dikarakterisasi mampu mendegradasi fraksi aspaltik dan teridentifikasi secara berurutan sebagai, *Acinetobacter* sp., and *Mycobacterium* sp. Berdasarkan hasil penelitian, *Bacillus* sp. (isolat 1) dan *Lysinibacillus fusiformes* (Isolat 2) memiliki kemampuan terbaik dalam mendegradasi fraksi aspaltik, kemampuan biodegradasi fraksi aspaltik secara berurutan adalah 50% dan 55%, dan laju pertumbuhan pada fase eksponensial secara berurutan adalah  $7.17 \times 10^7$  CFU/mL.hari dan  $4.21 \times 10^7$  CFU/mL.hari.