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Rehabilitation of petroleum waste-polycyclic aromatic hydrocarbons contaminated soil

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Abstract

Soil contamination by petroleum wastes, including polycyclic aromatic hydrocarbons (PAHs), is a persistent and widespread pollution problem that affects almost all compartments of the environment and causes serious health consequences and ecological disruption. The main objective of the present study is the decontamination of soil artificially contaminated with the two-ring PAH naphthalene (NAP) through a biological process known as bioremediation.

Initially, we selected a bacterial strain, *Bacillus* sp., isolated from contaminated soil from the In Amenas oil quagmire, using successive enrichment on MSM media with naphthalene as the sole carbon source. The strain exhibited optimal growth kinetics at pH 7 and 45°C, indicating thermotolerance, which is advantageous for the degradation of PAHs in hot environments.

The rehabilitation test involved inoculating the bacterial strain *Bacillus* sp. into microcosms containing approximately 200g of soil artificially spiked with 100 mg of naphthalene. Biodegradation was monitored every 3 days for two weeks using GC/MS. The results showed degradation rates of 43%, 58%, 73%, 86%, and 97% over the successive time points.

Keywords: Rehabilitation, Soil contamination, Decontamination, Bioremediation