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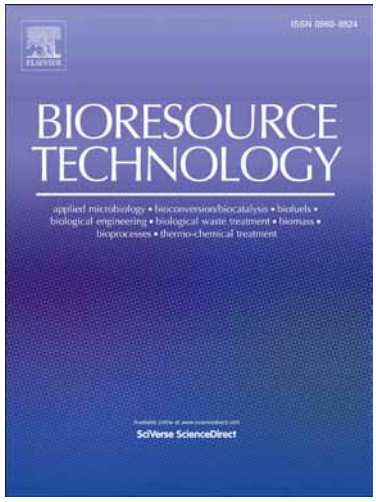

Biodegradation and kinetic study of benzene in bioreactor packed with PUF and alginate beads and immobilized with *Bacillus* sp.-M3

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Biodegradation and kinetic study of benzene in bioreactor packed with PUF and alginate beads and immobilized with *Bacillus* sp.-M3

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Abstract:

Benzene removal in free and immobilized cells on polyurethane foam (PUF) and polyvinyl alcohol (PVA)-alginate beads was studied using an indigenous soil bacterium *Bacillus* sp.-M3 isolated from petroleum-contaminated soil. The important process parameters (pH, temperature and inoculums size) were optimized and found to be 7, 37^{o}C and 6.0×10^{8} CFU/mL, respectively. Benzene removals were observed to be 70, 84 and 90% within 9 days in a free cell, immobilized PVA-Alginate beads and PUF, respectively under optimum operating conditions. FT-IR and GC-MS analysis confirm the presence of phenol, 1,2-benzenediol, hydroquinone and benzoate as metabolites. The important kinetic parameter ratios (μ_{max}/ K_s; L/mg·day) calculated using Monod model was found to be 0.00123 for free cell, 0.00159 for Immobilized alginate beads and 0.002016 for Immobilized PUF. Similarly inhibition constants (K_i ; mg/L) calculated using Andrew-Haldane model was found to be 435.84for free cell, 664.25 for Immobilized alginate beads and 724.93for Immobilized PUF.

Keywords: Benzene, Free cells, Polyurethane foam, GC-MS, Kinetic models.

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