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Novel investigation of the performance of continuous packed bed bioreactor (CPBBR) by isolated *Bacillus* sp. M₄ and proteomic study

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Abstract:

The present study reveals the benzene degrading potential of bacterial species isolated from petroleum contaminated soil. Genomic analysis suggests that *Bacillus* sp. M₄ was found to be dominating species. The process parameters were optimized and found to be pH 7.0±0.2, temperature 32±5°C, immobilization time (20 days) and benzene concentration 400 mg/L. The maximum removal efficiency of benzene was calculated and found to be 93.13% at elimination capacity 156 (mg/L/day) and inlet loading rate 192 (mg/L/day) achieved in 54th days of operation. In the study, the residual metabolites were analyzed by GC/MS analysis and identified as benzene-1,2-diol. In order to identify the responsible protein involved in the process of benzene biodegradation, The proteomic study was performed and proteins were identified by MALDI-TOF analysis. The molecular docking was confirmed by the benzene biodegradation.

Keyword: Benzene, MALDI- TOF MS/MS, Proteomics, FT-IR, CPBBR, Docking

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