



4. Conclusions

Section A

The bacillus sp. M3 isolated from petroleum-contaminated soil was found capable of degrading benzene in a batch reactor with free cell and immobilized cell systems with PUF and Aalginate beads as solid support. The immobilized systems performed well for all range of benzene concentrations but free cell system fails to provide significant degradation a higher concentration of benzene. Better efficacy of immobilized systems was also supported by significantly higher value of inhibition constant (K_i) for these systems as compared to free cell system calculated using Haldane-Andrews model. The FTIR and GC-MS results confirm the degradation of benzene and formation of metabolites.

Section B

The performance of CPBBR packed PUF and immobilized with *Bacillus* sp. M4 isolated from petroleum contaminated soil was evaluated under varying loading condition for biodegradation of benzene. The effect of process parameters on the biodegradation of benzene using *Bacillus* sp. M4 was studied under optimum condition. During the performance of CPBBR to investigate more than >90% removal efficiency was observed at a concentration of 400mg/L. The role of biocatalysts (enzyme) released during biodegradation of organic compound are very crucial and decide the rate as well as final product in the bioremediation.