

## Optimization of Lead Bioremediation by Marine *Halomonas* sp. ES015 Using Statistical Experimental Methods

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**Abstract :** Bioremediation technology is now used for treatment instead of traditional metal removal methods. A strain was isolated from Marsa Alam, Red sea, Egypt showed high resistance to high lead concentration and was identified by the 16S rRNA gene sequencing technique as *Halomonas* sp. ES015. Medium optimization was carried out using Plackett-Burman design, and the most significant factors were yeast extract, casamino acid and inoculum size. The optimized media obtained by the statistical design raised the removal efficiency from 84% to 99% from initial concentration 250 ppm of lead. Moreover, Box-Behnken experimental design was applied to study the relationship between yeast extract concentration, casamino acid concentration and inoculum size. The optimized medium increased removal efficiency to 97% from initial concentration 500 ppm of lead. Immobilized *Halomonas* sp. ES015 cells on sponge cubes, using optimized medium in loop bioremediation column, showed relatively constant lead removal efficiency when reused six successive cycles over the range of time interval. Also metal removal efficiency was not affected by flow rate changes. Finally, the results of this research refer to the possibility of lead bioremediation by free or immobilized cells of *Halomonas* sp. ES015. Also, bioremediation can be done in batch cultures and semicontinuous cultures using column technology.

**Keywords :** bioremediation, lead, Box-Behnken, *Halomonas* sp. ES015, loop bioremediation, Plackett-Burman

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