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**Continuous Biosorption of Arsenic and Cadmium by
Moringa oleifera in a Packed Column**

PROJECT REPORT

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ABSTRACT

Water is the source of life and energy, although millions of people worldwide are suffering with the shortage of fresh and clean drinking water. The presence of heavy metals in the water is one of the major concerns because of their toxicity and threat to human life. They tend to persist indefinitely and accumulate in living tissues throughout the food chain which has humans at its top. These toxic metals can cause accumulative poisoning, cancer, and brain damage when found above the tolerance levels, thus becoming a serious threat to the environment. The use of locally available, low-cost and ecofriendly plant biomass for the biosorption of heavy metals for environmental protection and recovery of valuable metals offers a potential alternative to existing treatment technologies

In the present work, the performance of locally available, low-cost and ecofriendly plant biomass such as powdered seed of the *Moringa oleifera* for biosorption of Arsenic and Cadmium was studied. Batch adsorption experiments were performed as a function of pH, biosorbent dose, contact time, volume of the solution and initial metal concentration. The present study revealed optimum conditions for the removal process which included dose of biosorbent (2g for arsenic and 4g for cadmium), initial metal concentration (25 mg/l), initial pH (2.5 for Arsenic and 6.5 for cadmium,) contact time (60 min for Arsenic and 40 min for Cadmium) and volume of the solution (200ml). The maximum efficiencies of Arsenic and cadmium removal by the powdered seed of the plant *Moringa oleifera* were 63.53% and 65.36% respectively. The results were well fitted by both Langmuir and Freundlich isotherm models. The dynamic removal of arsenic and cadmium by powdered seed of the *Moringa oleifera* was studied in packed column. The effect of bed height (4 and 8 cm) and flow rate (2ml/min and 5 ml/min) on biosorption process was investigated and the experimental breakthrough curves were obtained. Results showed that by increasing the bed height and decreasing the flow rate, the breakthrough and exhaustion times increased. The break-through time was considered as a measure of the column performance. The maximum break-through time of 320 min was achieved at the operating condition of 2 ml/min influent flow rate and bed height of 8 cm.