

Bioadsorption of Arsenic from Aqueous Solution Using Fe (III) - Loaded Vetiver Root Powder

Dasu Ram Paudel*¹, Bhoj Raj Poudel¹, Surendra K. Gautam¹ and Megh Raj Pokhrel²

¹ Department of Chemistry, Tri-Chandra Campus, Tribhuvan University, Kathmandu, Nepal. ² Central Department of Chemistry, Tribhuvan University, Kathmandu, Nepal.

*E-mail: drpaudel005@gmail.com

Excess of arsenic (>10 mg/l) in drinking water is harmful to human health because of its carcinogenic nature. Moreover As(III) is more toxic than As(V). Various treatment technologies for removing arsenic from groundwater have been investigated. Recently, biosorption is emerging as alternatives for sequestering heavy metals being cost effective and environment friendly. The present study showed that Vetiveria zizanioides, a herbal plant commonly known as Vetiver is an effective adsorbent for the removal of arsenic from aqueous solution. Iron loaded Vetiver root powder showed good adsorption capacity than the fresh powdered Vetiver root. The ability of Vetiver root powder to adsorb arsenic from aqueous solutions has been investigated through Batch experiments. The arsenic adsorption was found to be dependent on adsorbent dosage, pH, initial concentration and contact time. Batch absorptive de-arsenation was conducted under variable experimental conditions such as pH, agitation time, dose of adsorbent and isotherm study. Maximum de-arsenation was achieved at pH 5; there is a greater possibility of columbic interaction between arsenic ion and adsorbent surface at this pH. The percentage of arsenic removal increases with adsorbent dose and time at a given initial solute concentration. Sorption isotherm test showed that equilibrium sorption data were better represented by Langmuir model than freundlich model and the maximum adsorption (q_{max}) of As (V) on FeVRP was found to be 1.527 mg/gm.

Keywords: adsorption, Batch experiments, de-arsenation, concentration, groundwater, effective adsorbent.