

## **FATE AND TRANSPORT OF SELECTED NUTRIENTS AND HEAVY METALS IN NANOSCALE ZERO VALENT IRON AMENDED SAND COLUMNS**

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To date, Zero Valent Iron (ZVI) has been used as a universal treatment for treatment of pollutant plumes in temperate regions. However, no considerable attention was laid on evaluating the applicability of nano ZVI (NZVI) for landfill leachate treatment in the tropics. Hence, the aim of the present study was to understand the applicability of organically modified NZVI as a permeable reactive barrier material for the treatment of heavy metals (i.e. Pb and Zn) and nutrients (i.e. nitrate and phosphate) in landfill leachate from Gohagoda dump site. The starch stabilized NZVI (S-NZVI) was synthesized by modifying the borohydride reduction method with starch as the stabilizing agent. The silica sand columns were constructed in a Teflon centrifuge tube (5.2 cm × 2.8 cm ID) and relatively high S-NZVI particle concentration (0.1 g of S-NZVI for 1 Kg of silica sand) was applied for avoiding S-NZVI mobility through the sand column. The experiments were conducted with 0.1% S-NZVI (by weight) for most common nutrients and heavy metals in landfill leachate, NO<sub>3</sub><sup>-</sup>, PO<sub>4</sub><sup>3-</sup>, Zn<sup>2+</sup> and Pb<sup>2+</sup>. The initial Zn<sup>2+</sup>, Pb<sup>2+</sup>, NO<sub>3</sub><sup>-</sup> and PO<sub>4</sub><sup>3-</sup> concentrations used in this study were 86, 75, 100 and 140 mg/L, respectively, based on the preliminary studies with 1 mL min<sup>-1</sup> flow rate by using a cartridge pump. The porosity and the hydraulic conductivity of the sand column are 0.4598 and 2.36 × 10<sup>-3</sup> cm/s respectively. Removal of NO<sub>3</sub><sup>-</sup> and PO<sub>4</sub><sup>3-</sup> were indicated around 0.5 mg/g. Further, Pb<sup>2+</sup> and Zn<sup>2+</sup> removal were observed as ~100 and 50% respectively. Leaching of NZVI was not observed in the resultant solution.