ARSENIC REMOVAL FROM WATER USING MAGNETITE COATED QUARTZ SAND COLUMN

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Abstract

Arsenic has become a major contaminant of concern due to the increase knowledge of its toxicological and carcinogenic effects. This fact has prompted the need to investigate suitable methods for lowering arsenic concentrations in drinking water by rapid, simple and low cost techniques so the process utilizing natural geo materials as adsorbents has been promising. The sorption of As (III) and As (V) onto iron oxides has been studied previously and proven success. In this research Sri Lankan Magnetite coated quartz sand are evaluated as arsenic sorbents due to their high surface area and minimal production of waste.

Magnetite coated Quartz was prepared according to literature. Columns with different fillings and operating conditions were set up to evaluate the effect of their combinations on Arsenic removal. Effluent solutions were collected at 1 h interval for each trial and analyzed for residual Arsenic through Atomic Absorption Spectrophotometer. Experiments were conducted separately for Arsenic (iii) and (iv).

Magnetite coated Quartz accomplished better Arsenic removal with an iron weight of 14.68 mg g^{-1}. In this work arsenate was better adsorbed than arsenite. Moreover the experimental results visualized a significant difference in Arsenic removal over the investigated grain size ranges and removal efficiency of As (v) decreased above pH 6 and comparably As (iii) removal efficiency against pH variation demonstrated consistent pattern.

The experimental results suggest that the adsorption generally depended on the surface area of the adsorbent and adsorption isotherm results were best fitted with Langmuir model. Further, the maximum adsorption capacity of As (iii) was greater than As (v). The decrease of arsenate removal efficiency in alkaline pH can be explained by the formation of colloids. As for the conclusion, this study demonstrated that Magnetite coated sand could be an effective media for Arsenic removal from water in a fixed bed reactor.