

Evaluating Goethite-Laterite Fixed-bed Adsorbent Of Hexavalent Chromium [Cr (VI)] In Mine Wastewater

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Abstract

The presence of hexavalent chromium in dangerous concentrations in mine wastewater poses a hazard to the environment and emphasizes the development of technology in wastewater treatment is important. This study focused on the simulation of a fixed-bed adsorption column of soil and water wherein the relationships of porosity with that of the adsorption rate and capacity, and the estimated time of saturation was investigated through COMSOL Multiphysics®. It was found that the rate of adsorption was faster as the porosity of the material increased. The estimated time of saturation was faster as the porosity of the material increased. At lower porosities, a higher maximum adsorption concentration occurs near the inflow location. Moreover, it was found that the concentration of adsorbed species increases exponentially with time at the onset of adsorption. Further studies involving lab-scale experimentation, filtration column fabrication, and desorption mechanism are recommended to be able to create a product for actual industry applications.

Figures used in the abstract

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Figure 1 : Figure 1. Effect of porosity on the estimated time of saturation for a) 0.3, b) 0.2, and c) 0.1 porosity settings.