(135)

Performance of Thermally Activated Laterite Soil as Adsorbent for the Removal of Phosphate and Fluoride

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Abstract

The present study aims to examine the efficiency of two different laterite grain sizes and thermal activated laterite soil as an adsorbent for removal phosphate and fluoride ions from synthetic wastewater under laboratory conditions. The soil was collected from the Western province of Sri Lanka by auger drilling method. Collected soil samples were air-dried for 48 hours to remove the excess moisture content. Air-dried soil was crushed to prepare powdered material (2 mm and 500 µm). Thermally activated soil samples were prepared by heating the laterite at 100º C, 200º C, 300º C and 400º C for 3 hours in a muffle furnace. Adsorption conditions of phosphate and fluoride ions for the soil samples were determined by batch experiments conducted under room temperature and natural pH. Based on the results of studies, 300º C and 400º C (2 mm and 500 µm) thermal activated laterite soil proved to be an effective adsorbent and had higher removal capacities than other soil samples. 20 mins for 2 mm grain size and 10 mins for 500 µm were the optimal contact times for maximum removal of phosphate and fluoride ions. 0.75 g of laterite soil was identified as the optimum soil dosage.The results concluded that, the percentage of removal rises with the increase in temperature. In contrast, results revealed that, thermal activated laterite soil has a strong ability to remove the phosphate and fluoride from water.

Keywords: Adsorption, Activated Laterite, Phosphate, Fluoride, Optimum time