Use of Laterite Soil as a Filter Material to Remove Copper from Aqueous Solution

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Elevated levels of heavy metals in drinking water are found to have severe impacts on human health. Therefore, effective treatment method is of prime importance. Several techniques are available to remove heavy metals from water. However, all those methods are not cost effective and viable to the environment. Hence, it is important to study alternatives from natural resources. Laterite is a low cost novel adsorbent available in the country. Thus, the aim of the present research is to study the possibility for the use of activated laterite to filter copper from aqueous solution. In the experimental design, acid activated, thermal activated and raw laterite with 2 mm grain size has been used for the adsorbent trials. Experiment was conducted for 15 days continuously and copper removal efficiency was calculated. In addition pH, Oxidation Reduction Potential, Electrical Conductivity and Total Dissolved Solids of filtrates were studied to investigate process of treatment. Results indicate the average Cu removal efficiencies of acid activated, thermal activated and raw laterite is 89%, 98% and 98% respectively for an aqueous solution with 10 ml min^{-1} flow rate and 2 ppm initial copper concentration. After 15 days, acid activated laterite system has shown higher pH reduction and most of the samples were in pH below 6.5. Other two systems have shown pH within 6.5 - 8.5. Acid activated laterite system has shown positive Oxidation Reduction Potential values and other two systems have shown negative values at the beginning and change to positive values. Both Electrical Conductivity and Total Dissolved Solids curves showed upward trend with time for all three systems. According to the performance of the materials it can be concluded that laterite as an ideal material for removal of copper. Conversely, due to the high cost of activation, raw laterite can be considered as the best filter material for the removal of copper from an aqueous solution.

Keywords: Laterite, Filter, Activation, Cost