Arsenic Removal from Water by Using Rice Husk Ash

N.P. Edirisinghe', B.A.J.K. Premachandrd , C.K. Jayasuriya[3]
'Department of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka
'Department of Chemical and Process Engineering, University of Moratuwa, Sri Lanka
'Department of Chemistry, University of Kelaniya, Sri Lanka

Arsenic is a toxic heavy metal present in water in organic and inorganic forms. It is highly toxic in its inorganic form. Long-term exposure to inorganic arsenic, mainly through drinking water, can lead to various health issues. The current research focuses on removing arsenic from water by the adsorption method using Rice Husk Ash (RHA). Particularly, RHA was used to check its suitability for arsenic removal since it will enable a value addition to the agricultural by-product. Rice husks were washed, dried and ground and then separated into different particle sizes using sieve analysis. Ashes from the rice husks were produced using a muffle furnace at 5 different temperatures as 300 ℃, 400 ℃, 500 ℃, 600 ℃ and 700 ℃. The resulting ashes were used as the absorbent in the columns through which 75 ppb arsenate solutions were passed. The experiments were carried out to determine the effects of particle size, charred temperature, pH and the use of RHA treated with phosphoric acid. Amounts of arsenic adsorbed were determined by using Atomic Absorption Spectrophotometry. Maximum adsorption was observed for RHA with particle sizes in the range (150 -500) 1.1.111 and the lowest for RHA with particle sizes in the range (125 -150) p.m. This result is deviated from the expected results. Theoretically, adsorption should be higher for small particles due to larger surface area. The maximum adsorption occurs at a charred temperature of 600 ℃. Decreasing adsorption efficiencies after pH 7.0 for untreated RHA and after pH 7.5 for treated RHA were observed and it could possibly be due to the adsorption of more hydrogen ions due to high ion migration rate and high ion concentration. However, further investigation is required to study the effect of pH on the adsorption of arsenate by untreated and treated RHA.

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