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Arsenate removal by dried luffa plant coating iron in groundwater

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Abstract

Arsenic has acknowledged as one of the serious pollutants in groundwater. At high doses, it causes many human diseases related to skin, lung and other organs such as vascular disease, renal disease, chronic lung disease, hyperkeratosis, skin lesions, etc. Many methods applied to remove arsenic in an aqueous environment; however, the adsorption approach is usually chosen because it is an efficient, economy-effective and relatively easy-to-use method. Recently, arsenic adsorption by plant emerges as a low-cost and environmentally friendly method. In this study, first time, the dried fibre of the luffa plant was used to remove arsenate from groundwater. In order to enhance the positive charge of the adsorbent surface, which was very favorable to arsenic anion attraction, the luffa fibre was coated by iron oxide. As a result, the arsenate removal efficiency of raw luffa fibre increased 70 times after modification. The optimized pH of luffa fibre was identified at 3 and the co-existing phosphate anion was the most influenced to the arsenate adsorption process of luffa fibre. The analysis of scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDS), Fourier transform infrared spectroscopy (FTIR) and zeta potential determined the characteristics of luffa fibre and its modified form. In addition, these analysed results helped to clarify the mechanism of the adsorption process.

Biography

Thi Thuc Quyen Nguyen has completed her master's program at the age of 27 years from Ho Chi Minh City University of Technology, Vietnam. She is studying for her Ph.D. at the University of Technology Sydney, Australia. Her research focuses on the pollution of arsenic in groundwater. In addition, she concentrates to look for novel, low-cost, local materials that can be used as an efficient adsorbent to remove arsenic, by that reducing the cost of application