

Partially De-Proteinized Human Hair: A Novel Bio Material for Arsenic Remediation

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Abstract—*Despite arsenic (As) is known to bind with human hair proteins, hair has never been utilized for its removal from contaminated water. The performed study demonstrates the development of filtration matrix and efficacy of chemically treated human hair for the (As) removal from aqueous feed. In the experiment the normal human hair was partially de-proteinized and molded to porous matrix form. The physico-chemical characterization of the developed matrix was done with XRD, FTIR, SEM, and TGA. The matrix thus formed was used as a filter for the (As) contaminated water to pass through. The filtrate was then analyzed to determine the concentration of (As) by Atomic Absorption Spectroscopy (AAS). The XRD and TGA study revealed the purity and thermal tolerance of developed matrix for the application. The FTIR spectrum confirmed the partial de-proteinization of hair matrix contributed toward the exposure of more functional groups for the binding to (As) and SEM micrographs showed gross distortion in the hair structure to provide increase surface area for adsorption of (As). The AAS analysis illustrated the maximum (As) adsorption in first 30 minutes of exposure, after which the rate of adsorption attains equilibrium. However, the major challenge is the further improvement in developed matrix to control its fragile behavior and reusability as a filtration unit.*
