J Material Sci Eng 2017, 6:9 (Suppl)
DOI: 10.4172/2169-0022-C1-086

The removal of toxic anions from wastewater solution using quaternized polyvinylbenzylchloride electrospun nanofibers

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The presence of arsenic and phosphate in waters, especially wastewater, has become a worldwide problem even till the present time. Efforts are being made to remove these contaminants, arsenic (v) and phosphate from wastewater using low cost adsorbents. In the present study, removal of arsenic(v) and phosphate from wastewater using novel fabricated sorbent material; Aminated polyvinylbenzylchloride (PVBC) prepared through a substitution reaction and then quaternized using three alkyl groups (R'=CH_3, C_2H_5 and C_3H_7) were investigated. The effect of pH, initial sorbate concentration, amount of sorbent, effect of co-existing anions and the reusability in batch and solid phase extraction mode were also investigated. From the experiment conducted, the pH shows a decisive factor on arsenic and phosphate removal. The results show that, arsenate and phosphate sorption on the fibers were achieved within 40 min at pH 5 (PVBC R'=CH_3, C_2H_5 and C_3H_7) for arsenic (v) and 20 min at pH 5.0 PVBC (R'=CH_3, C_2H_5 and C_3H_7) for phosphate by ionic interaction. The functionalized fibers reduced the concentrations of the analytes from 50 µg/l to 10 µg/l within the shortest possible time compared to the conventional methods attributed to the electrostatic interaction between the positive charge on the sorbent materials and the negative arsenate and phosphate ions.

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